TROPICAL AGRICULTURE

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TROPICAL AGRICULTURE is published at the Imperial College of Tropical Agriculture, St. Augustine, Trinidad, West Indies, at the end of the third week of the month preceding the one of issue. Advertisement rates can be obtained at the College from the Editor, or from the Secretary of the College, 14, Trinity Square, London, E.C., England. The Editor will be glad to consider authoritative articles for publication. It is understood that opinions expressed in signed articles are those of the author and do not necessarily represent the policy or opinion of the College Authorities. Correspondence, which will be replied to, is invited on all matters pertaining to tropical agriculture, science and development.

LORD MILNER.

WHILE the last issue of this Journal was in the press we learnt with deep regret of the death of Lord Milner, Chairman of the Appeal Committee of the College. While never an unswerving admirer of his political convictions we yield to none in our admiration of the tenacity and courage with which he pursued those policies. We are particularly grateful to him for his espousal of the aims and aspirations of the College and all for which they stand. Indeed it is due to his efforts as Secretary of State for the Colonies that he College owes its existence. In response to representations from the West Indian Colonies he appointed a strong Committee to consider the desirability of establishing a Tropical Agricultural College in the British West Indies. As a result of the recommendations of the Committee the Imperial College of Tropical Agriculture was formally opened in October, 1922.

The time is opportune for the correction of two erroneous impressions which appear to have become current regarding the nature of the College. In the first place it has been stated that the College is purely a West Indian institution and, as such, does not command the financial sympathy and support of other parts of the Empire. This is not the case. It is of course true that the College is situated in the West Indies, and that it originally began to function as the "West Indian Agricultural College," but its name and outlook were early broadened to include the whole of the tropical portions of the Empire, and for this purpose those in a position to deliver an authoritative judgement are of the opinion that no better site could have been selected.

In the second place it is asserted that the College is a Government Institution and as such should be supported solely by Government funds. This, too, is inaccurate. The fact that the College has received financial support from the Imperial Parliament and certain Colonial Governments is merely evidence that the standing and importance of the College is officially recognised but, as the Secretary of State for the Colonies, the Rt. Hon. Lt.-Col. L. S. Amery, M.P., recently stated, "It is not in any sense an official or bureaucratic body . . . The main work of that body and the most effective work from day to day is divided equally between representatives of the great business interests affected and the scientific world."

In view of the fact that the College would depend in the main upon voluntary contributions from interested Colonial Governments, private firms, and individuals, Lord Milner addressed himself to the task of raising £100,000 as an endowment fund for the College. A promising start had been made as the result of the generosity of certain West Indian islands and British Guiana and a few interested institutions and individuals. Subsequently experience has shown that the estimate of £100,000 will be too small if the full Imperial scope of the College is to be realised. £25,000 has already been secured and the Appeal Fund Committee is earnestly at work in an endeavour to secure the remaining £75,000.

Coincident with the news of Lord Milner's death came the report and recommendations of a Committee under his Chairmanship, appointed, by the Secretary of State for the Colonies, to consider and report on the recruitment and training of officers for the agricultural departments of the non-self-governing dependencies. This report, accompanied by an important circular, has been despatched to all the governments concerned. Mr. Ormsby-Gore, Parliamentary Under-Secretary of State for the Colonies recently emphasized the shortage of agricultural officers, forestry officers and the like, and urged that the existing situation was a crying disgrace to the British Empire. Mr. Amery, Secretary of State for the Colonies, in his circular, agrees with the findings of the Committee as to the highly unsatisfactory position in which the problem of recruitment and training for Colonial Agricultural departments now stands. He adds, "I am convinced of the necessity for taking without further delay, comprehensive measures to insure in the future a sufficient and constant supply of candidates thoroughly qualified, both as regards their personal character and their intellectual and technical equipment, to fill vacancies as they occur in the agricultural departments from year to year."

"With a view to attaining this result the committee have recommended the immediate creation of a pool from which officers of the kind required can be annually recruited for any suitable vacancies which occur in the Colonial services. To create this pool they propose that 20 post-graduate scholarships should be offered annually, provided that thoroughly suitable candidates can be found for all of them. The first year would be spent in the study of the economic and other aspects of agriculture in this country, or, in the case of specialist candidates, in research work. The second year of this course would comprise the study of agriculture under tropical and sub-tropical conditions. This part of the course would normally be taken at the Imperial College of Tropical Agriculture which has been so successfully inaugurated at Trinidad."

Mr. Amery draws special attention to the fact that a pool is necessary in order to overcome the very adverse effect on recruitment of the unevenness in the annual demand for officers for the Colonial Services. This uneven demand is due to the fact that Colonial Governments are unable, for various reasons, accurately to forecast the number of recruits they will require in future years, sufficiently far in advance to encourage an adequate number of suitable candidates to prepare themselves beforehand for such appointments by undertaking an appropriate form of study.

"As the Committee point out, the supply under present conditions is very inadequate. The proposals of the Committee will, I believe, not only considerably augment the existing supply by encouraging a larger number of men of a suitable type and education to prepare themselves for the careers offered by the Colonial agricultural services, but will also make it possible to fill in the serious gaps which at present exist—from the point of view of the needs of agriculture in the tropics and sub-tropics—in the course of training at present open to students. Particularly is this so in regard to an apprenticeship to agriculture under tropical conditions prior to appointment."

"In conclusion, I wish to emphasize my full general agreement with the Committee's report and the great importance which I attach to the adoption of their recommendations. Indeed, after the experience gained during the last few years of the difficulties of recruiting under the existing conditions, I feel it necessary to say that unless the committee's recommendations as to a scheme of scholarships are carried out, I cannot guarantee that I shall be able in the future to obtain an adequate supply of recruits."

The Governing Body of the College has intimated its willingness to undertake the training of these students but it will be realised that the necessity for securing an adequate endowment fund is rendered all the more urgent. In view of the accomplishments of the Dutch in Java, and the Germans in East Africa before the war, and the United States of America in her tropical possessions, it seems inexplicable that Great Britain, controlling the destinies of a greater area of the tropics than any other nation, should have lagged behind in this important provision. As Mr. Ormsby-Gore has emphasized, it is through the work of men of this type, adequately trained and reasonably paid that "we shall be justified in history as a great Imperial Power." The Empire in general and the College in particular are the poorer for the loss of such a distinguished statesman as Lord Milner. While it must be left to history to deliver a dispassionate judgment upon his career we venture to express the belief that in establishing an institution destined, we hope, to play an important role in the development of our tropical areas, he accomplished the crowning achievement of his life. The consummation of this effort is dependent, not upon posterity, but upon the whole-hearted co-operation of all who are interested—and who is not?—in tropical development, and we trust that the efforts of Lord Burnham and the Appeal Committee of the College may meet with a full measure of success, and that, though tardily following in the wake of other countries, Great Britain may yet take foremost place in the development of the tropics by scientifically trained agriculturists.

On page 149, we have great pleasure in publishing an appreciation of the work of two prominent Agricultural Officers, Messrs. J. R. Bovell, I.S.O., and Joseph Jones, who recently retired from active service. Mr. F. R. Shepherd, who contributes this appreciation, is peculiarly fitted for the purpose, having served with them as a brother officer for the past 33 years. We embrace the opportunity of wishing these two officers happiness in their retirement

TROPICAL DEVELOPMENT.

The Principal entertained by the West Indian Club.

(Speeches by Viscount Burnham, Mr. G. Moody Stuart and the Principal.)

ON May the 7th the Principal was the guest of the West Indian Club at dinner when the development of the tropics and the importance of securing scientifically trained men for the purpose were the main points dwelt upon. Viscount Burnham presided in the absence of Mr. G. Moody Stuart, Chairman of the Finance Committee of the College, who was prevented from attending owing to the illness of Mrs. Stuart. Sir Robert Rutherford, Chairman of the Club and a Governor of the College was also unable to attend.

Lord Burnham, in proposing the health of Dr. Leake, said he was fortunate in the fact that Mr. Moody Stuart had prepared the speech which he had intended to deliver on that occasion, and therefore, all that was left for him to do was to read it. (*Laughter.*) In the course of his speech Mr. Stuart said that the College had made a most encouraging start under Sir Francis Watts, but by the age limit he was bound to retire at an early date, and they were fortunate in securing Dr. Leake as his successor. (*Cheers.*) He had spent twenty-five years in India in connection with Botany and Agriculture, at one time in research, at one time in teaching, again as Director of a Department of Agriculture, and again as Principal of the Agricultural College at Cawnpore.

It is a satisfaction that young as the College is it is already able to be of service to some important interests. The great Cotton industry, in organising Colonial cotton growing, looked for help to the College. As soon as the doors were open it sent six young men to be trained in cotton growing. These were now in Africa, from the day of arrival able to do efficient work. Now a further six had been sent to the College who would also follow to Africa before long.

Then there was the sugar industry, also important to the Colonies, and the College was ready to back up all efforts for improving production. It had a splendid factory, the gift of home engineering firms, in running order for teaching and research. The result he was sure would be that part of the sugar production required for our own needs, which was at present obtained from foreigners, would be supplied instead by our fellow-subjects. (*Cheers.*) Within recent weeks they had also been asked to assist with bananas.

A committee appointed by the Government had also recommended that all officials appointed to the Department of Agriculture in any of the Colonies should, before taking up their duties, pass through a period of training in the College. There was thus a fresh demand upon them for important service. To enable the College to cope with the enlarged field of work, it was decided to make an appeal for £100,000. So far £25,000 had been received. While the governing body was keen to serve the whole Empire, Dr. Leake seemed endued with a double portion of their spirit. He was inspired with the Imperial spirit in the best sense, and he had aims which he was now working out that were startling in their magnitude and boldness. (*Cheers.*)

Although it ill became him to praise a speech which he had just delivered, Lord Burnham added, amid much laughter, that he was bound to say he thought very highly of its merits. (*Cheers.*)

Dr. Leake, in reply, expressed his great regret at the unfortunate circumstances causing the absence of Mr. Moody Stuart, who had taken such a keen interest in the College from the start. Continuing he said that when they looked at the development of the Empire during the last seventy-five years the thing that struck him most was first, the enormous development of the population of the world, and secondly, that the development was in the temperate climes, which were rapidly filling up. More than that, it had been an industrial development. During the next century there must, to his mind, be a great development of the tropics. If the temperate world was getting filled, the tropics had got to supply the raw materials of the industries by which the people in the temperate climes lived. If that was so it was going to be a development of raw products—a development of transport and a development of agriculture. For that purpose an enormous number of trained people would be required and it is time a beginning is made. The Imperial College of Tropical Agriculture, therefore, had an Imperial aspect.

The fact that the College was in the West Indies had been very largely due to the generosity of the West Indies. There were, it seemed to him, two benefits that they would derive from the situation of the College. The West Indies were restricted in area, and they had more and more a difficulty in knowing what to do with the younger generation. In finding careers for the young people through the College the West Indies would have a big advantage. The research that took place at the College would also be of enormous advantage to the West Indies. He had spent twenty-three years in India, and he had been all over Ceylon, and a large part of Africa, and he could candidly say that he could not think of a more suitable place for the College. (*Cheers.*)

Among those present were :

Sir Edward Davson, Sir William Goode, Sir Alfred P. Sherlock, Mr. Algernon Aspinall, C.M.G., B.A., and Mr. Alexander Elder (hon. treasurers of the club). Mr. John Allsopp, Mr. W. P. Baker, Mr. Oliver Barritt, Mr. Claude T. Berthon, Mr. W. G. Clark, Mr. W. Cradwick, Colonel G. S. Graggs, Mr. A. W. Davson, Mr. E. A. de Pass, Mr. J. M. Du Buisson, Mr. A. D. Ferguson, Mr. John Franklin, Mr. D. J. Frank Gibbon, Mr. T. D. Hampson, Mr. M. Hardy, Mr. R. S. Haughton, Mr. A. H. Jupp, Captain Paul H. Mangin, Mr. David Morrin, Mr. James J. F. Morrison, Colonel H. B. Newnham, Mr. W. H. Parratt, Mr. C. W. O. Rochs, Mr. Edward Salmon, Mr. J. D. Seedorff, Mr. R. W. Sharples, Mr. H. P. Sheldon, Mr. E. C. Stembridge, Mr. A. B. Tucker, and Captain F. F. C. Messum (hon. secretary of the club.)

BANANA CULTIVATION.

PROFESSOR J. SYDNEY DASH, B.S.A.

[*Address delivered to the Trinidad Agricultural Society May* 14, 1925, *and embodying the results of certain field researches undertaken by Professor Dash notably in connection with varieties, propagation, time to plant and prune, &c., under Trinidad conditions.*]

THIS paper is not intended as an exhaustive treatise on the subject of banana cultivation. An effort, nevertheless, will be made to cover the more important points in that connection, special reference being made to the work which my department has been endeavouring to do. At the outset a word or two as to how the College came to be interested in banana projects may not be out of place. It was largely due to the initiative of Sir Francis Watts, who, becoming impressed with the rapid spread of Panama disease affecting Gros Michel, the principal variety exported in these parts, solicited the interest of the Colonial Office and suggested the possibility of raising varieties from seed with the hope of finding something resistant. The United Fruit Co., one of the largest concerns directly interested in the banana business has been studying the disease problem for years, much of their work being centered round the search for and testing of resistant varieties for their commercial possibilities. Such varieties do exist (see *Tropical Agriculture* Vol. I No. 11 page 172) but so far none have been found with the outstanding commercial characteristics of Gros Michel. Obtaining varieties from seed is a phase that has been taken up by the College, hybridization work having been started by Professor Mason in the fall of 1922, when he had at his disposal plots of the common edible bananas at St. Augustine and certain seeded forms at St. Clair. I need not give the details of these results which were embodied in a paper by myself (having taken over the work in its later stages) read at the Jamaica Agricultural Conference early last year and which will be published in due course. One of the hybrids obtained is at present fruiting. In addition to this work a banana collection has been brought together and studies are also in progress on types of suckers, their fruiting values, dates of planting, pruning and shipping tests. The whole banana question is now in the hands of a committee comprised of the Principal, the Professors of Botany, Mycology and Agronomy and the Director of Agriculture.

1.—History and Commerce.

The banana is thought to be indigenous to Asia and Africa and was first brought to America, it is supposed, from Spain early in the 16th century and planted in the island of Santo Domingo, from where it spread to the surrounding islands and mainland. There is a strong belief, however, that two species of the banana were cultivated in tropical America before the coming of Europeans. The Gros Michel banana is recorded as being introduced into Jamaica from Martinique in 1836. The first importation of bananas into the United States is given as taking place in 1804, when thirty bunches were carried from Cuba to New York. In 1830, there were 1,500 bunches, but it was not until the formation of the United Fruit Co. in 1899 that the industry really assumed large proportions. The following tables give the imports and their values into the United States and the United Kingdom from the principal producing countries for the years 1913 and 1922. The figures show the increasing importance of the banana trade in which it is earnestly hoped the Colony of Trinidad and the neighbouring islands at no distant date will be able to participate.

Imports of Bananas into the United States.

Countries of Origin.	1913.	1922.
	bunches.	bunches.
Costa Rica	6,973,684	3,704,727
Guatemala	2,359,250	4,498,800
Honduras	7,983,591	14,584,674
Nicaragua	1,681,944	2,603,491
Panama	4,438,300	3,665,378
Mexico	1,541,504	739,186
Cuba	2,213,733	1,808,872
Colombia	2,684,749	2,205,538
British Honduras ..	651,064	460,825
British West Indies (chiefly Jamaica) ..	11,164,894	10,689,186
Other Countries ..	664,396	134,215
Total quantity, bunches	42,357,109	45,094,892
Total value	$14,484,258	$19,145,911

Imports of Bananas into the United Kingdom.

Countries of Origin.	1913.	1922.
	bunches.	bunches.
Canary Islands ..	2,138,080	2,645,444
Republic of Honduras ..	———	1,185,492
Costa Rica	2,614,186	1,228,059
Colombia	2,255,504	4,163,695
Other Foreign Countries	32,451	3,507
Total Foreign Countries	7,040,221	9,226,197
British West Indies (chiefly Jamaica) ..	499,763	1,804,963
Total quantity, bunches	7,539,984	11,031,160
Total value	$ 2,172,688	$ 5,315,109

2.—Relationship and Structure.

In this discussion we are little concerned with the botany of the plant in all its aspects : suffice it to say that the genus Musa to which the banana

belongs is a fairly large one containing many species. Among its near relatives are the Traveller's Tree (genus Ravenala) and the *balisier* (genus Heliconia) of the cacao orchard. On the other hand, some knowledge of the general structure of the plant is necessary to understand how to deal with it agriculturally. As in all plants, there is the root, stem, leaves and flowers.

Root.—Comprising the root system, there are generally speaking both horizontal and vertical roots, the latter often going to a very considerable depth—4 feet in Gros Michel, the horizontal 2 to 3 feet. The main roots are fleshy and cord-like—to secure the plant in the ground —from which the finer feeding roots are developed. Under favourable conditions, the fleshy roots grow rapidly. Fawcett records 2 feet in a month in Gros Michel, and has traced them to a distance of 17 feet from the stem.

Stem.—The trunk we see carrying the leaves is not the true stem, but leaf tissue forming a pseudo-stem, the true stem being the bulb or rhizome from which roots and suckers are developed and which is the storehouse of the plant. From this also springs the fruiting stalk which pushes its way through the cylinder of leaf tissue forming the trunk, and eventually produces flowers and fruit. On the size and food stored in the bulb will depend the size of the bunch ; if too many suckers are allowed to drain its reserve the bunches will be small.

Leaves.—As practically the whole plant seen by the eye is leaf structure, no wonder it is a rapid grower producing more food in proportion to the area occupied than many of our chief staples. The leaf blade it will be noticed is entire and not adapted to windy situations like the coconut with its divided leaves. Exposed to high winds the plants suffer, tall varieties like Gros Michel or Giant Fig being broken or completely blown over.

Flowers.—There are three kinds of flowers ; the female or pistillate with long ovaries which produce the future bananas ; the neuter or hermaphrodite found midway on the stalk, forming short and useless fingers ; the male with very small ovaries and much pollen found at the end of the stalk. Each cluster or hand has its own covering or bract which falls off as its protecting work is over. Gradually the young fruits turn upward as the stalk with bunch assumes a pendulous habit. It takes the bunch from three to six weeks to make the passage from the bulb to the apex, and from 2½ to 4 months after shooting before the fruit is full, the longer time being taken in the dry season.

3.—Varieties.

Only those of any merit commercially will be mentioned. Successful carriage, it should be pointed out, depends on several factors—ability of the fruit to handle well, strong central stalk, compact and not straggling bunch, with imbricated hands and close-fitting recurved fingers, not easily damaged or broken off. The outstanding one in this connection is Gros Michel, so susceptible to Panama disease. Resistant ones under observation are :—Congo, Grenada Giant Fig, and Surinam Bumulan. The Congo has already been tried by the United Fruit Co. ; its poor shipping qualities have practically ruled it out as a substitute for Gros Michel. This is unfortunate for it is a heavy producer and a good type of tree, being midway in size between Gros Michel and Governor. It appears to be the same banana referred to in Jamaica as Robusta and as Porto Rico banana in Dominica. The Grenada Giant Fig is a variety of great promise : it is too soon to say how far it can take the place of Gros Michel but it would seem to be the best of those so far tried. The flavour is excellent while its ability to carry and ripen attractively are still subjects of investigation. The Bumulan appears to be in the same category, likewise the St. Lucia Giant Fig or Bout Rond. We have all these under observation at present with a view to determining definitely their relationship and qualities.

The Claret banana possesses some value commercially and is being grown by the United Fruit Co. to some extent in replacing Gros Michel attacked by Panama disease. The price of this fruit is good but there is a very limited demand.

The Canary or Dwarf banana, also known as Chinese or Cavendish, and locally as Governor Fig is the banana grown in the Canaries for European markets. It may be found in many parts of the tropics and sub-tropics where conditions are suitable for its growth. It is cultivated in Fiji and Queensland on a commercial scale, and being dwarf in habit is not much affected by winds and cyclones. It is also resistant to Panama disease and is the earliest maturing variety, but as special facilities have to be provided in the way of packing and crating, it becomes costly to handle when grown at considerable distances from markets and is not favoured by shipping companies ; moreover, the American consumer, a large factor in the trade, appears to be wedded to Gros Michel type.

In our variety collection, already referred to, will be found a number of interesting types which have been obtained so far only in the West Indies and the Guianas. Some represent the remains of a collection originally obtained through Kew from the East many years ago and distributed to the various Botanic Stations, where Panama disease in several instances depleted their ranks. Several appear to be the same thing under different names, Gros Michel included. It is planned to make a careful study of all Gros Michel material, including that obtained from the different districts of Trinidad and the other islands now represented in the collection.

4.—Soils and Climate.

The best soil considering the type of root system would be a deep, well drained but retentive loam, with a large proportion of humus. The banana actually flourishes on a wide range of soils

providing there is good drainage, thorough tillage and ample moisture with adequate attention to keeping up supplies of organic matter. Rich alluvial soils are very suitable; apart from being extremely fertile, the physical and mechanical condition of such soils is especially favourable to bananas.

As to climate, in Central America where the Gros Michel is cultivated, the best locations seem to be a few miles in from the sea, elevation of not more than 250 feet, rainfall 80 to 200 inches. In Jamaica, on the north side the rainfall is 90 inches per annum and on the south side bananas are grown by irrigation. In the Canary Islands, irrigation is practised with the Dwarf banana; this, however, is less exacting in the matter of moisture and good bunches can be produced even in this district of St. Augustine where the rainfall is around 60 to 65 inches, and the countryside swept by high, drying winds in the dry season. These climatic conditions, therefore, are certainly not the best for Gros Michel or Giant Fig, if a high percentage of nine-hand bunches is to be obtained. Windbreaks, heavy manuring and mulching will be essential to ensure even the smallest measure of success.

5.—Propagation.

The banana plant produces two types of suckers (1) broad leaved suckers which from the beginning produce leaf blades of the same general form as those of the adult plant and known as maiden suckers; (2) narrow leaved or sword suckers, producing small narrow blades at first, later changing and taking on adult foliage. The former usually arise at the top of the parent bulb and at an early time develop their own roots, but show little bulb growth compared with the sword suckers which originate deep in the ground, often underneath the parent stock from which they draw nourishment and thicken out before beginning to show much above the ground. This type is usually preferred for planting and in Jamaica, they are allowed to reach the age of 6 to 8 months when they are cut back to within 6 to 8 inches of the bulb and the roots trimmed off. A side bud from this is allowed to develop into the new plant, growth from the central bud not being particularly favoured, the tendency being for this to produce a smaller bunch even though early. At the College we have tried out on a small scale the different kinds, namely, 6 to 8 months old suckers cut back, typical swords about 3 feet tall untopped, and young adult or maiden suckers (broad leaves). We have been impressed with the remarkable vigour of shoots from large side buds on the bulbs; in several instances, three months were sufficient for them to catch up to the sword which required a little more time to get started. In Jamaica, these bulbs are frequently left to dry out for three or four days before being planted or sometimes piled in heaps and covered with trash for a month, when those showing the most prominent buds are selected. In Central America, the United Fruit Co. usually cut up large heads into pieces weighing 3 to 4 lbs. each with at least one good eye, which are planted with the cut surface up. Bulbs cut up in this way may be better examined for pests and disease, if such are prevalent.

From observations on the Gros Michel and Dwarf varieties, we see little in the end to choose from at present in either untopped sword suckers or bulbs, except that the latter are undoubtedly preferable for securing a better anchorage in the ground—very essential in windy situations—and may be considered as more reliable in unfavourable soil and weather conditions. On the other hand, the former may produce good bunches earlier than side buds from bulbs but not earlier than heartbuds from bulbs, these last, however, tending to give smaller bunches. For these reasons, tall swords appear to be preferred in Jamaica for supplying established fields or for planting in protected situations.

In starting up new plantations where material is scarce there is often little choice; under such conditions resort must be had to nurseries—especially too if Panama disease is a factor to be reckoned with—where only the cleanest disease-free suckers should be collected. This applies with particular force in the case of Gros Michel. Where banana weevil is bad, suckers with little bulb development may prove advantageous for nursery purposes, as it is principally in the older fleshy rootstocks that the insect multiplies. In any case, all planting material should be soaked in water, preferably for 48 hours, as a precautionary measure which will be found reasonably efficient. Great care should be taken of the nursery so that the plants may develop as rapidly as possible and produce a large percentage of good suckers for final setting out in the field. Mr. Scudamore of the United Fruit Co. who visited these islands some time ago is reported in a Grenada paper as saying that with an expenditure of £12, one acre of nurseries planted 6 feet by 3 feet (2,420 plants) would when grown be sufficient to set out 6 acres of bananas 11 feet by 11 feet.

6.—Preparation of Land.

This should be attended to very carefully. Unless grown in virgin soil, deep ploughing—if possible subsoiling—will be found most profitable. The growing of a vigorous cover crop will also be useful as a weed control measure and for supplying humus. Soils deficient in lime should be supplied with this element. The roots of the banana plant are soft and fleshy and for that reason thorough tillage is necessary for their active growth and spread—both of which contribute to the vigour and productivity of the plants. Sound agricultural methods on the lines practised for sugar-cane with which it could be grown as a rotation crop where the rainfall is suitable are recommended. Proper drainage too is absolutely essential. These operations completed, holes for the reception of the suckers must be dug. These should be wide and deep so that the vertical roots may penetrate deeply and secure a firm anchorage.

Plants are frequently blown over even with ordinary winds when planted too shallow. We usually dig our holes 2½ feet square and 2 feet deep, keeping the surface soil separate from the subsoil. Pen manure is then mixed with the former and the holes filled about half way for some days before planting. In Jamaica, wide planting is advocated, although the distance varies with the district, 14 feet each way being favoured. At this distance, some planters put two suckers to the hole with the hope of getting an extra large return from the plant crop, but it is not the usual practice; in this connection, much depends on the fertility and moisture conditions. We have adopted at the College a distance of 12 feet by 12 feet for Gros Michel and Giant Fig; this suits our drainage system, the land being divided into 36 feet beds which just gives three plants in width. These beds would hold four plants of the Governor in width, if planted 9 feet by 9 feet. The suckers are carefully placed in the centre of the holes with the soil and manure firmly pressed around them; where bulbs are used, the tops should be covered with at least 3 inches of earth. If bananas are planted as ground shade for young cacao trees adequate attention must be given to all the points raised if large bunches for export are required.

7.—Time to plant and prune.

Time to plant will depend somewhat on the weather conditions, but if late winter and spring markets are aimed at, early planting is favoured. In Jamaica, Gros Michel is usually planted in March and April, May rains (or irrigation) being relied on to start the plants so that fruit may be obtained in ten to twelve months time. In Trinidad, the dry season cannot be depended on to produce very effective showers and such early planting may not be generally satisfactory. We are now testing out this point by planting bulbs in every month of the year, commencing last January. While too early to make any definite pronouncement, indications are that where this type of sucker with large stores of reserve food is used, provided it is free from weevil and disease, the plants have a better chance of coming through. At the present time, however, we are in a position to report results from June and October plantings previously made. Suckers of good type put in during October 1923 produced mature (marketable stage) fruit in from 11 to 14 months—Giant Fig slightly ahead of Gros Michel, while small maiden suckers not recommended) of Gros Michel took 16 months to yield similar fruit. Planted in June 1924, Gros Michel has given fruit in 9 to 10 months, small maiden suckers producing smaller bunches than either bulbs or swords. The maiden sucker may therefore be discarded with confidence as not being the best for planting.

It would appear from these trials that late planted not only developed slower but produced smaller bunches than June planted, which under our conditions may be expected with good cultivation to produce fruit about March and April when the demand is best. As the season extends from January to June, by arranging plantings from late May to mid-July, fruits from plants should be coming in over the period March to June. We have next to consider the timing of suckers as followers to succeed the parents and which may be expected to supply fruit for January and February. Sufficient data has not yet been obtained on which to base a definite statement. It is known, however, that followers take a little longer than plants and we have noticed that the dry season has a retarding effect. Present indications are that a sucker coming out of the ground about October should produce fruit in 15 to 16 months, that is about January-February, and if another sucker is left four months after, fruit might be expected from it about May-June. (Ratoons tend to produce later and later with age and are more difficult to time.) Thus, a regular sequence of bunches would be provided for in season, the full effect not being realized until the third year. The order of procedure suggested, therefore, is as follows: plant late May, June to early July, not later; prune off all suckers around the strong leading plant until October, when leave one just coming out of the ground; then leave another on the other side four months later always retaining suckers of the sword type for fruit. The policy after that would depend to some extent on the length of time (preferably 4 to 6 years) before replanting, but in general, keeping three suckers to each clump in the manner suggested seems advisable, unless soil and climatic conditions permit more with profit. In this connection maximum prices it will be noted are only paid for nine hand bunches, a high percentage of which can only be obtained by careful pruning. In this operation the suckers not wanted should be taken out low down else they will grow again and if later selected for fruit will prove disappointing. They should be removed when not more than 1 or 2 feet high, applying the cutlass with the point away from the mother plant so as not to injure it. Followers should be left in such a position that they will not be damaged in case of an older trunk in the same clump falling over. An effort too should be made to keep the clumps in their original lines to permit of easy cultivation by implements.

[*This article will be concluded in our next issue when Professor Dash will deal with the after-treatment, harvesting, pests and diseases, cost of production and returns.*]

The College Syallabus for the Session of 1925-26 is now available and can be obtained, post free, on application to the Secretary, Imperial College of Tropical Agriculture 14, Trinity Square, London, E.C. 3 or to the Registrar, Imperial College of Tropical Agriculture, St. Augustine, Trinidad, B.W.I.

Subscriptions to *Tropical Agriculture* can commence at any time during the year.

COMMERCIAL CITRUS PECTIN.

IN a recent bulletin from the United States Bureau of Chemistry (No. 1323, March 9th, 1925), Dr. H. D. Poore gives an account of his investigations of the properties of citrus pectin and of methods for its production on a commercial scale. Pectin is the substance which gives to marmalade, jams and fruit-jellies their characteristic coherence and stiffness. It is readily extractable from citrus peels by merely boiling with acidified water, but the conditions of extraction must be controlled between certain rather narrow limits if a product possessing the highest jellifying power is desired (F. Hardy, *Biochem. Journal*, 1924, p. 283.)

Perhaps the chief drawback to the employment of citrus rinds as a source of commercial pectin, is the difficulty of removing (1) highly flavoured components of essential oil, (2) the residuum of acids used in the extracting solution, (3) colouring matters, and (in the case of grape-fruit and certain varieties of orange), (4) bitter principles.

Poore found that dialysis through collodion-impregnated cloth eliminated most of the bitter principles, when present, but that the process was too slow and too wasteful of pectin to be commercially feasible. He subsequently showed that the most satisfactory method was to dissolve out with alcohol the impurities present in powdered crude pectin, which may be obtained by drying solutions of pectin in a spray-vacuum pan, such as is used by makers of powdered milk. The process is expensive to operate, however, and accordingly, Poore experimented with highly concentrated crude pectin solutions, which he washed with alcohol on the continuous counter-current principle. This was found completely to remove aromatic substances, bitter principles, acids and colouring matters, with a minimum usage of alcohol.

It appears from Dr. Poore's account, that the employment of alcohol in preparing satisfactory preparations of pectin from citrus rinds is unavoidable. This imposes a serious drawback on the commercial manufacture of citrus pectin by planters, a conclusion which has also been reached independently by F. H. S. Warneford of the Leeward Islands Laboratory in the British West Indies.

Mr. Warneford has been experimenting for some time on the preparation of pectin as a possible by-product industry for lime growers in the West Indies. His results, unfortunately, have not yet been published in print. After many unsuccessful attempts to prepare marketable pectic acid in gel form, Warneford abandoned this phase of his work, and directed attention to the purification of dried pectin extracts with alcohol. At first, his products possessed an undesirable dark colour, but this disadvantage was later overcome by careful evaporation of the pectin solutions under diminished pressure. Substantially Warneford's final results and conclusions are very similar to Dr. Poore's.

Because, however, the large-scale use of alcohol in commercial plant-products processes was considered by Warneford to be impracticable in the British West Indies (mainly because of customs regulations), the researches were practically discontinued at this stage. Nevertheless, a great deal of useful information and experience were derived from the work, and will doubtless be available in the event of any favourable revision of regulations relating to the use of imported alcohol, or in the event of the erection of factories for the manufacture and use of alcohol in bond. Since the development of many other promising tropical plant-products processes depends also on cheap and easily available alcohol, it is to be hoped that more serious consideration will be given in the near future to the possibilities of manufacturing industrial alcohol in British tropical colonies, and to means of controlling, by far-sighted and careful legislation, its sale and use in quantity.

F. HARDY.

THE COLLEGE.

The Right Hon. L. S. Amery (Colonial Secretary) was the guest of Viscount Burnham at a luncheon given at the Savoy Hotel, yesterday, to meet Dr. Martin Leake, the Principal of the Imperial College of Tropical Agriculture, and to discuss the development of that institution. Those also present were :

Sir Arthur Shipley (chairman of the governing body of the college), Earl Buxton, Sir George Lawson Johnston (chairman of Bovril Ltd.), Mr. E. Wigglesworth (Wigglesworth and Co., representing flax and East Africa), Mr. Charles F. Wood (chairman of the Colonial Bank), Mr. H. Eric Miller (Harrisons and Crosfield Ltd., representing tea and rubber), Sir James Currie (director of the Empire Cotton Growing Corporation and governor of the college), Mr. F. W. Hayne (Chilean Nitrate Committee), Dr. L. Haden Guest, M.P., Mr. Stanley Machin (chairman of Batger and Co. Ltd., representing confectionery, and deputy president of the Associated Chambers of Commerce) Mr. Gilbert C. Vyle (president of the Birmingham Chamber of Commerce), Mr. J. Sandeman Allen, M.P. (president of the Liverpool Chamber of Commerce), Dr. Alfred Ree (president of the Manchester Chamber of Commerce), Mr. J. H. Batty (chairman of the African and Eastern Trade Corporation), Mr. B. Marwood, Mr. Algernon Aspinall (secretary of the college), and Mr. T. D. Hampson (assistant secretary of the special appeal committee).

Dr. Martin Leake dealt with the essential needs of the college, the more immediate of which are the provision of a hostel and an estate on which practical experience can be gained of the business side of agriculture. To meet these £75,000 is still required, and it was agreed that a deputation should wait on the Government to urge the needs of the college, and, further, that an endeavour should be made to secure support through the Chambers of Commerce.

The great part which the college will and must play in the development of the Tropics, on which every resident in this country is so largely dependent, was emphasized. Mr. Amery stated that a broad view must be taken when considering the necessity of supporting the college. The big industrial trades of the country would be greatly helped by the development of the knowledge of tropical agriculture, even though in some cases this help did not appear to be direct or generally evident. The Americans and Germans had already realised this fact and profited by it. Sir Arthur Shipley endorsed Mr. Amery's remarks and emphasized the necessity of our tropical possessions to the Empire as a whole. Sir James Currie stressed the value of trained men to the various departments of tropical agriculture and the harm that untrained men could do in the same position. It seemed to him anomalous to spend large sums of money on improving transport facilities in the Empire without providing for the training and education of a staff to deal with the production of the necessary raw materials and foodstuffs which were to be carried.

The presidents of the various Chambers of Commerce all spoke, and agreed that the development of the college was absolutely essential. They agreed to do all they could to help the funds in their own districts.—The "*Daily Telegraph*," May 8th.

A WORLD FORESTRY CONGRESS.

BY agreement between the International Institute of Agriculture and the Italian Government a Committee has been established for organizing a *World's Forestry Congress* to take place in Rome early in May, 1926. The headquarters of this Committee are at the International Institute of Agriculture in Rome.

The Congress will bring together experts in forestry and the timber and allied industries from all parts of the world, and it is hoped that truly valuable and profitable results will be reached through the exhaustive discussions, which are expected to take place on all those problems of Forestry which are of really international importance.

At the same time, in connection with the International Fair at Milan, there will be held an important exhibition of forest products and the machinery used in their conversion, which will enable visitors to examine the different products of the wood manufacturing industries and the wood working machines made in the various countries, and should serve to increase the flow of international trade in this important branch of commercial activity.

Various excursions to the more typical forest lands in Italy, and possibly in other countries, will be arranged to follow the work of the Congress.

The Congress is already arousing the warmest interest as it is considered to be the most important event in connection with Forestry and the allied industries that has as yet taken place.

MR. J. R. BOVELL, I.S.O., AND MR. JOSEPH JONES.

An Appreciation.

F. R. SHEPHERD,
Agricultural Superintendent, St. Kitts.

AT the end of March, 1925, two prominent Agricultural Officers in the West Indies, J. R. Bovell, I.S.O., Director of Agriculture in Barbados, and Joseph Jones, Agricultural Superintendent, Dominica, Leeward Islands, retired from active service.

J. R. Bovell entered the Government service in Barbados in April, 1883, when he was appointed Superintendent of Dodds Reformatory. It was during his term of office there that the Manurial Sugar-cane experiments were started in Barbados by Sir John Harrison, then Island Professor of Chemistry, and it was in collaboration with him that the possibilities of raising new varieties of canes from seed was successfully introduced by Mr. Bovell, and established on commercial lines. This great advance in the history of the sugar-cane has been the means of saving the industry in some places, and in all parts of the sugar world these seedlings raised by Mr. Bovell are found taking prominent positions.

In 1898 on the establishment of the Imperial Department of Agriculture the services of Mr. Bovell were enlisted by Sir Daniel Morris, the then Imperial Commissioner of Agriculture, and this work of raising cane seedlings was carried on on a more extensive scale. Later his connection with the Imperial Department of Agriculture was severed and he was appointed Director of the Local Department of Agriculture, Barbados. From this office he retired on his well earned pension on March 31st carrying with him, I am sure, the appreciation of his fellow countrymen and all connected with agriculture.

His extensive practical knowledge in connection with the sugar-cane and agricultural conditions, has been recognized outside Barbados as he has on several occasions been invited by foreign Governments and Syndicates to visit and report on agricultural conditions.

Mr. Joseph Jones, who retired on pension from the office of Agricultural Superintendent, Dominica, Leeward Islands, on March 31st, was trained at Kew and was appointed to Dominica in 1892. All who have had the pleasure of visiting the beautiful Gardens in Dominica, and meeting Mr. Jones, will appreciate the excellent work done by him during his term of office.

Mr. Jones was possessed of wonderful practical knowledge, and love of his Garden, which, in addition to his training at Kew, made his work in Dominica so eminently successful. His knowledge of local conditions in Dominica, acquired by long years of experience, was a valuable asset to the planting community which will be missed by them.

MYCOLOGICAL NOTES.

Selection of Sugar-cane in Louisiana for tolerance to Mosaic Disease.

The Planter and Sugar Manufacturer for March 7th, contains an interesting article by Edgerton and Taggart on the mosaic situation in Louisiana and some preliminary selection experiments. The sugar planters over a large portion of the State are now confronted with an almost total mosaic infection of their four standard varieties : Purple, Striped, D. 74, and D. 95 so that they are forced to plant infected seed. The disease spreads so rapidly in Louisiana that seed selection and roguing have proved fruitless. The situation is being met by the recently founded cane-breeding and propagating station at Canal Point in Florida, equipped and maintained with funds provided jointly by the Federal Government and the Louisiana Experiment Stations. Resistant varieties collected in other countries, after being passed through a rigid quarantine at Washington, are sent to this station for propagation and then for trial under Louisiana conditions. The station is also undertaking extensive work in cane-breeding and may become one of the leading centres for such work. For a number of years the planters will, however, have to carry on with the old varieties and any way of lessening the reduction of yield due to mosaic is likely to receive close attention.

The authors noticed that in fully infected fields, especially of D.74 and Purple canes, the stools showed marked differences in tolerance to the disease ; some carried more and larger stalks with darker green foliage bearing fewer of the characteristic mosaic spots or stripes. Seed taken from such tolerant stools has been grown for three seasons alongside cane raised from unselected seed, a fresh selection being made each year. In the first year (1921) the cane was lost through fire. In 1922 and 1923 the comparative yields in tons per acre from the selected and unselected seed of the two varieties were :—

	1922	*1923*
D. 74.		
Unselected	10·58	8·85
Selected	14·00	11·90
Purple.		
Unselected	17·40	18·50
Selected	19·90	19·70

In commenting on these results the authors say " It may be claimed that other factors of health and vigour were unconsciously considered when the selections were made each year." " There is little doubt, however, that a portion of the increased yield was due to the less serious damage caused by the mosaic." It was often difficult to detect the symptoms of mosaic on the foliage of the stools grown from selected seed, except near the bases of the unfolding leaf-blades ; the plants were strikingly larger and the foliage of practically normal colour as compared with adjacent stools raised from unselected seed.

The differences of tolerance to mosaic shown by individual stools of the two varieties is attributed to bud or somatic variation ; it may prove sufficiently stable under similar external conditions to be of economic value and could doubtless be found to occur in a number of other varieties susceptible to mosaic infection.

The behaviour towards mosaic of some varieties in Hawaii to which reference was made in the preceding number of this Journal is apparently of a similar nature. In D. 1135 the presumed variation in the direction of increased tolerance resulted in the total disappearance of all mosaic symptoms in a high proportion of individual stools.

The authors also refer to another aspect of the disease—the well-known differences among varieties in resistance to infection. Their own seedling L. 511 notable for its high sucrose content, but unfortunately a low yielder, has proved decidedly resistant to infection. They point out that in this seedling the cluster of leaves at the apex of the stalk is much more compact than in many varieties and may make access to the tender tissue in the spindle, where infection can alone occur, difficult to the insect (*Aptus aphis maydis*) which acts as a vector. It is evident that this point may deserve the consideration of cane-breeders if it holds good also in the case of other varieties known to be resistant to infection such as D. 1135, H. 109, 100 P.O.J., &c.

In referring in a general way to varieties, cultivated in Java they repeat the myth that mosaic has been overcome there by growing highly tolerant seedlings. They had in mind, doubtless, the hybrids raised by Kobus by crossing the Batavian thick cane with the thin Indian Chunnee two of which though wholly infected by mosaic are now the standard varieties in Tucuman, Argentina, while one is largely planted in Formosa. A reference to the very full and very accessible annual reports on the area planted to the varieties in Java, shows that these tolerant canes do not occupy and never have occupied more than an infinitesimal part of that area, a fact which is the more remarkable because they were capable of solving the " sereh " problem.

The planters in Java have preferred to control " sereh " by the much more costly mountain-nursery method. They grow only plant cane under intensive cultivation and aim at high tonnage and high sucrose ; the mosaic tolerant sereh resistant root-rot resistant hybrids are considered good enough only for poor land or spots hard to drain. It would, in fact, appear that mosaic is not fully controlled in Java and is probably causing as much trouble now as at any time since it was first noticed there in 1890.

S. F. A.

EMPIRE COTTON.

BY SIR JAMES CURRIE AND MR. W. H. HIMBURY.

AT a meeting of the Committee on Industry and Trade held at the Board of Trade on Wednesday, 29th April, with Sir Arthur Balfour in the Chair, evidence was given on behalf of the Empire Cotton Growing Corporation by Sir James Currie, Director of the Corporation, and on behalf of the British Cotton Growing Association by Mr. W. H. Himbury, General Manager of the Association.

After referring to the causes which had produced a shortage of raw cotton, and especially that of the American type, Sir James Currie dealt with the possibilities of extending the crop in the British Empire. He indicated that the principal obstacles so far encountered have been :—

(*a*) lack of transport facilities,

(*b*) political and administrative difficulties.

By arrangement with Mr. Himbury the former problem would be dealt with by him.

As regards the political and administrative difficulties, Sir James Currie mentioned political unrest, and stated that in several countries the steady development of cotton production was being hampered in different ways by political conditions.

An administrative difficulty felt in all countries of the Empire was deficiency of adequate technical staff in the Agricultural Departments. The Corporation had recognised this fact from the time that they commenced work, and for the past four years had awarded a number of scholarships to enable suitable candidates for the Agricultural Services to be adequately trained. The Colonial Office also had appointed a strong Committee, with Lord Milner as Chairman, to investigate the training, pay, prospects, status and qualifications of the Agricultural Services in the Crown Colonies. Sir James Currie stated that this Committee would probably recommend that all cadets for these Services should be sent for a year's post-graduate training to the Imperial College of Tropical Agriculture in Trinidad; and he recommended that the College should be placed on a sound financial basis. The provision of that Institution with adequate funds for its important work would benefit the production not only of cotton but of many other staple tropical products.

Sir James Currie mentioned that in order to assist the Agricultural Departments of cotton growing countries, the Corporation had made grants to various Universities and Scientific Institutions in this country, in return for which problems referred to the Corporation from the Tropics can be investigated there by the best men available.

As regards the finance of the Crown Colonies, Sir James Currie expressed the view that the present form of financial Control in undeveloped territories retarded progress, and he compared the rate of development in many of the Crown Colonies working under this system with that of the Anglo-Egyptian Sudan in its early days.

In conclusion, Sir James Currie stated that as regards land tenure in Africa, many problems remained to be settled, and the Authorities were at present far from having reached a general consensus of opinion on this important subject. The formulation of a definite progressive policy on this question was, in his opinion, a necessary antecedent to the full economic development of some of our possessions in Africa.

Mr. Himbury pointed out that the Lancashire cotton trade produced about one-fifth for the Home trade and four-fifths for export, but depended almost entirely upon foreign countries for its supplies of raw material. The principal source of supply of course was America, and for the World's requirements 14 million bales of American cotton were necessary. Previous to 1921 America had produced in excess of 14 million bales, but for 1923-24 American production was not quite 11 million, of which America herself required between 6½ and 7 million bales for her own consumption. The problem, therefore, had now become acute, and the only remedy for Lancashire lay in the rapid development of cotton growing in the tropical and sub-tropical countries of the Empire. This was the purpose for which the British Cotton Growing Association had been formed in 1904 when funds amounting to £500,000 had been subscribed, nearly all by employers and employees in the cotton industry.

Mr. Himbury then gave a summary of developments and prospects in Uganda, the Sudan, Tanganyika Territory, Nyasaland, Rhodesia, West Africa, India, Australia, South Africa, West Indies, Iraq, and other lesser producing countries of the Empire.

In conclusion Mr. Himbury expressed the opinion that experience had shown that the Empire was capable of producing very large quantities of excellent cotton which would assure Lancashire as to the sufficiency of its raw material. The further extension of cotton growing within the Empire was, however, dependent on improved transport facilities.

The building and financing of most of the Railways in our Colonies and tropical Dependencies in Africa had been financed by loans issued by the Colonies themselves, or under a guarantee by the Imperial Government, and in some cases the machinery of the Trades Facilities Act had been used. As the Interest and Sinking Fund, however, had to be found by the Colony, progress in transport development was necessarily slow. Mr. Himbury explained that this was not the fault of the Colonies, who had to the best of their ability done everything they possibly could to provide railways, &c.; but if quicker progress had to be made, he suggested that some other assistance would have to be given by the Imperial Government.

THE TROPICAL WORLD.

South Africa.

It is expected that the present South African cotton season will yield at least 25,000 bales, worth upwards of three-quarters of a million sterling. It has been estimated that within the next 20 years South Africa may be producing a quarter of a million bales a year, and it is not unlikely that the country's ultimate production will be a million bales. On a purely conservative estimate, a crop of half a million bales should realize about £12,500,000, and the two Government experts estimate that the total of the available cotton land in the country is four million acres.

During the last few years South Africa's cotton production has increased by 100 per cent. every season, and it is estimated that the increase this year will be over 300 per cent. At present the limiting factor is neither price nor acreage, but lack of white population. Native labour, though scarce in some places, is generally fairly plentiful. The rapid increase in production seems to be the forerunner of a great change in the country's policy with regard to the construction of railways in the cotton belts and the encouragement of settlers.

It is argued that cotton can be the solution of the "poor white" difficulty, and in this connection the Union Government is endeavouring to transfer indigents from relief works to agriculture; they are of opinion that it would be better to employ natives on relief works and to use the amount saved owing to the difference between white and native wages for the settlement of "poor whites" on the land.—(*The Times Trade and Engineering Supplement.*)

Siam.

In the course of a very instructive lecture on the "Progress and Possibilities of Siam," delivered before the Royal Society of Arts, Mr. W. Nunn gave an account of the principal features of the trade of this interesting kingdom. The total trade of Siam amounts to a value of £30,100,000 of which £13,600,000 represent the import trade, and £16,500,000 the export. The articles of import in their order of importance are textile goods, foodstuffs, metal manufactures, gunny bags, kerosene oil, tobacco, cigars and cigarettes, and machinery. The greatest volume of import trade is with Hong Kong. It would not be safe to set this to the credit of British trade, as a very great amount is transit traffic, and represents the activities of Japanese merchants. Next in order of value comes the United Kingdom, followed—at a considerable distance—by Singapore, China, India, Japan, the United States, Germany, Belgium, France and Holland. Of the export trade, rice accounts for £13,000,000; tin for £1,700,000; and teak for £560,000. The places of consignment in their order of importance are: Hong Kong, leading with four-fifths of the total; Singapore with almost one-third; Netherlands India, a long way below; followed closely by China, the West Indies and Japan. The share of the United Kingdom, as revealed by statistics of commercial exchanges, amounts to only one-eightieth of the total.

Of the minor exports some, it must be confessed, are more important for their peculiarity rather than their commercial magnitude. Eagle-wood, sandal-wood and spices, for example, turn one's imagination back to the days of the merchant adventurers; and Customs statistics recall the enthralling pages of Hakluyt. The tiger-bone and rhinoceros-horn exports, eagerly sought by the Chinese for medicinal purposes, are hardly less interesting than a consignment of dried monkey paws, destined for the same end. One commodity to be found in the export list has an interest of more practical value; it is the Krabau seed (Hydnocarpus anthelmincticus, Pierre), from which is extracted a remedy for leprosy which is giving most satisfactory results.

Queensland.

We referred last month to an article on Cotton Grading in the Sudan which appeared in the last issue of the "*Empire Cotton Growing Review.*" The same publication contains a similar article on Queensland by G. Evans, C.I.E., M.A., and L. L. Gudge. The authors state that although sporadic efforts had previously been made to develop a cotton industry, the greatest stimulus came with the high prices following the termination of the War. The Queensland Government in collaboration with the Commonwealth Government announced in 1920 that a guaranteed advance of 5½*d* per lb. would be given for all seed cotton of good quality, delivered at the nearest railway station or port. This guarantee was continued during the 1921-22 and 1922-23 seasons, and the immediate result was a large increase in production, which is indicated by the following figures:—

Year.	*Acreage.*	*Seed Cotton (Pounds).*	*Value of Crop at 5½d. per lb.*
1920	166	57,065	£ 1,308
1921	1,967	940,125	21,544
1922	7,000	3,876,677	88,466
1923	28,700	11,769,502	250,000 (approx.)

This system of guaranteed prices is being continued until July 31, 1926, the conditions of the guarantee to be announced each year and to depend to a large extent on the trend of prices.

The necessity for grading soon became apparent and a system was introduced in 1923. In the absence of trained local personnel, considerable difficulties were experienced, but this is being overcome as rapidly as possible, and a systematic attempt is being made to train men locally in the intracacies of stapling and classing, and the finer points of cotton grading generally.

Guatemala.

The Department of Overseas Trade has recently issued information regarding the Guatemalan Coffee industry, which shows that in 1923 951,169 centals of clean coffee were exported and in 1924 880,368 centals. Reliable information regarding the 1924-25 crop is lacking, but it is estimated that 900,000 centals will be available for export. The United Kingdom has failed to regain its pre-war position due largely to the dislike of the native planter to ship produce on consignment with the possibility of losses and delay, and also to the limitation of activity by British firms during the war when the trade passed almost entirely into American hands. The most interesting feature is the decline of the exports to the United States of America and the rise of Germany. In 1923 668,294 centals were exported to the United States of America and 173,962 to Germany and in 1924 384,368 and 361,582 centals respectively, showing that Germany is rapidly regaining her pre-war importance as a factor in the coffee trade. Among smaller consuming countries the exports to France rose from 947 centals in 1923 to 16,302 centals in 1924 owing to the treaty between Guatemala and France which permitted Gautemalan coffee to enter France at the minimum rate of import duties. Since the treaty has been denounced it is probable that future exports to France will decline to their previous low level. Recently the Guatemalan Government decreed a surtax on the export duties on coffee on a sliding scale according to the price ruling at the time of export. The surcharge amounts to $0.50, which, added to the former rate of $1.50 per cental, makes a total of $2.

Africa.

Reuter's Agency learns that with a view to the early despatch of an International Commission to Equatorial Africa, a Conference will assemble at the Colonial Office next week, under the charimanship of Mr. Ormsby-Gore, to consider the question of sleeping sickness in Africa. Great Britain, France, Italy, Belgium, Portugal, and Spain will be represented at the Conference by experts in tropical disease.

In addition to the Under-Secretary of State for the Colonies, Great Britain will be represented by Dr. A. G. Bagshawe, C.M.G., Director of the Tropical Diseases Bureau, and Dr. Andrew Balfour, C.M.G., Ex-Director of the Wellcome Research Bureau. Professor Campenhout, Director of the Public Health Service of the Belgian Colonial Office, will represent Belguim.

The French delegates are Professor Gustave Martin, formerly head of the Sleeping Sickness Mission in Western Equatorial Africa, and Professors Brumpt and Mesnil. Italy is sending Professors Lanfranchi and Alessandrini, Portugal M. Aires Kopke, and Spain, Drs. Villa and Rocafert.

The principal business on the agenda of the Conference, which is expected to last four days, is to decide on the personnel of the proposed Commission and the particular areas to be visited.

The Conference is the outcome of a decision of the League of Nations to institute inquiries into the African sleeping sickness scourge, as a result of which an expert committee was appointed under the chairmanship of Dr. Alfred Balfour. The recommendations of this Committee were approved by the League Council at Rome last December, and the meeting of this Conference is the next step.

Gold Coast.

A correspondent contributes to the *Gold Coast Leader*, some interesting reminiscences of Coomassie during the last fifty years, in the course of which he says :—" Coomassie has now a population of about 27,000 inhabitants, and about 150,000 within a ten-mile radius of the town. There are no better law-abiding, more peace-loving British subjects in the world than the Ashanti. Their capital, formerly one of mud houses, is rapidly being converted into a town of concrete buildings. Its roads go forth, in all directions like the threads of a spider's web, and these are not to facilitate the movements of armies, but to enable them to transport their produce. Its railway, with Coomassie at the junction of the V leads to both parts, uniting the capital of the Colony, Accra, with the harbour (in construction) of Takoradi.

Peru.

Although Peru at present produces the comparatively fair quantity of 180,000 bales, or, say, 40,000 tons of cotton, she is nevertheless a potential competitor with the United States for the vast consumption of Lancashire mills. It is estimated that Peru has a productive capacity of no less than 4,000,000 tons, or 18,000,000 bales, and for the expansion of her cotton industry only one thing is needed—the capital to enable her to irrigate the fertile pampas and make them bloom with the cotton plant. According to *Peru*, a monthly magazine published by the Peruvian General Consulate in London, capital that is daring enough to widen the Peruvian cotton areas will find profit awaiting its earliest crops. It appears that the cotton yield per acre in Peru is greater than in other countries. In the United States, in the better years, the yield was 309 lb. per acre, but in 1923-24 this was reduced to 130 lb. while in Egypt an acre yields 390 lb., and in India 370 lb., but Peru's average production is as high as 484 lb. per acre, varying, however, according to the district. In Lambayeque " upland " it varies from 484 to 553 lb. per acre, and in the valleys of Chancay, Chillon, Rimac, &c., the average ranges from 360 lb. per acre. In the Inca valley 562 lb. has been reached. The climate of the country is perfectly adapted to the growth of cotton, while no costly appliances or machinery are needed, and whether water is abundant or not makes very little difference to the developing plant.—(*The Chamber of Commerce Journal*, Vol. XLIX No. 585.)

Australia.

We learn from *Facts About Sugar* that the largest sugar crop (by over 100,000 tons) ever produced in Australia was made this year and as the new crop promises to give a still larger outturn members of the sugar industry are considering the situation.

One step in dealing with the situation raised by the change in Australia's status to that of a country with a surplus production has already been taken by the Central Sugar Cane Prices Board, which has announced that in view of the serious over-production (estimated by the Board at 200,000 tons) it would for the present make no further assignments of new land for cane culture. The Board further remarked that the general position of the industry had reached a serious stage owing to the over-production in 1924 and the larger prospective over-production in 1925, but that the question was one to be dealt with by the legislature or other competent authority. Pending such action, the Board considered it advisable to keep production within bounds so far as it could, and therefore intended not to allow the area under cane to be increased by the assignment of new lands.

Ceylon.

There was an increase of 20,178,085 lb. in the total exports of black and green tea from Ceylon last year, the exact quantity shipped being 203,680,013 lb., as compared with 183,501,928 lb. in 1923. As usual, the United Kingdom was the largest purchaser, taking 131,672,209 lb., as compared with 121,010,033 lb., in the previous year. In addition to the improvement of trade with the United Kingdom, increases were recorded in respect of Australia, which at 15,701,296 lb., purchased 4½ million lb. more than in 1923, while the United States increased her purchases by 1¼ million lb., to 17,812,336 lb. The Continent of Europe took 3,083,278 lb. as compared with 2,128,942 lb., and there was an increase of 3½ million lb. to destinations in Asia other than India. Exports to Egypt, which in 1923 showed an increase of 2½ million lb. over the previous year, registered a decrease of half a million lb., while shipments to France, New Zealand and India also declined by over one-quarter, three-quarters, and one-quarter million lb., respectively. Discussing the tea trade position, the annual report of the Ceylon Chamber of Commerce states that the prosperous conditions recorded for 1923 were more than fully maintained during last year, the average of all teas sold at the weekly Colombo auctions being Rs. 1·04, an improvement of 2 cents. The 1924 offerings on the whole were of good sound quality, and the general outturn very consistent, although towards the end of the season, stalky teas were more in evidence than they had been for some time. A noticeable feature of the year's production was the remarkably good teas from low-grown estates, many of which realised very high averages.—(*Chamber of Commerce Journal*, Vol. XLIX, No. 586.)

Grenada.

The Report of the Agricultural Department for 1924 shews that 85,394 cwts. of cacao beans valued at £201,547 were exported during the year. Nutmegs and Mace amounting to 19,369 cwts. and 3,234 cwts. valued at £95,321 and £24,874 respectively rank next among the exports. Mace, pale yellow, realised as much as 50 cents (2s. 1d.) per lb., while sound unassorted nutmegs soared to 40 cents (1s. 8d.) per lb., prices in excess of all war levels.

Carriacou remains the centre of the cotton industry. Prices in Liverpool were good and 2,842 cwts. of lint and 7,030 cwts. of seed valued at £15,180 and £2,755 respectively were exported. Prospects appeared promising. Other industries are of minor importance. Lime trees have been cut down in Carriacou in order to make room for cotton. Lime juice and oil to the value of £1,792 only, were exported.

The Department of Agriculture has continued the policy of fostering the development of minor agricultural products. Experiments with coconuts are being carried out, but owing to the low prices ruling no extension of planting can be reported.

The proposal to erect a central factory for refined muscovado sugar in the Southern portion of the island has not yet fructified although cane cultivation has been greatly extended in the area.

Mauritius.

According to the latest statistics received by the Secretary, Sugar Bureau, from the Mauritius Chamber of Commerce, the quantity of sugar received in Port Louis from 1st August, 1924 (the beginning of the crop 1924-25), to 27th February, 1925, amounted to 2,745,441 bags of 1½ cwts. each, against 2,459,993 bags during the corresponding period last crop year.

The table below gives the exports of sugar from 1st August, 1924, to 27th February, 1925, as compared with the exports during the corresponding periods in two previous crop years :

Countries.	*Crop* 1924-25. *Metric tons.*	*Crop* 1923-24. *Metric tons.*	*Crop* 1922-23. *Metric tons.*
Great Britain	31,775	180,773	203,468
Continent of Europe	1	—	—
America	7,603	—	—
India	149,563	2,299	5,157
Hong Kong	64	993	2,089
Other places	192	95	228
Total	189,198	184,160	210,942

The stocks of sugar out of the crop 1924-25 on the 27th February, 1925, amounted to 351,119 bags as compared with 123,085 bags on the 1st March, 1924. The stocks of sugar on the 31st July, 1924 (end of crop 1923-24), were only 8,161 bags.—(*Indian Trade Journal*, Vol. LXXVII, No. 981.)

Shansi.

Fibre-yielding plants, such as ramie and jute, which grow in low-lying regions, are not indigenous to Shansi. The province used to produce only sufficient fibre for the local market, consumed chiefly in making cordage and paper. The article did not acquire commercial importance until about six years ago. At present Shansi exports almost half a million catties of both ramie and jute fibres yearly, valued at $150,000. The reason for the increase of fibre production is twofold. With the improvement of irrigation on Shansi farms the growing of ramie and jute has been made possible in many places, and the brisk demand for fibres at home and abroad has given a further impetus to the cultivation of the plants. About a decade or so ago ramie and jute fibre was sold at about ten cents a catty on the Shansi local market. At present the figure has gone up by more than 150 per cent. in the case of jute, and by more than 200 per cent. in the case of ramie. The rapid advance in price has made it more profitable for the Shansi farmers to grow fibres than cereals, and this has accounted for the increase of the production. According to a Bulletin issued by the Chinese Government Bureau of Economic Information, 471,127 catties of both jute and ramie fibres were exported from the province in 1922, at an average price of about 25 cents per catty for jute and 33 cents per catty for ramie.—(*The Chamber of Commerce Journal*, Vol. XLIX, No. 585.)

Ecuador.

Estimates of the value of Ecuadorian exports for 1924 vary considerably, but in the opinion of the American Consul at Guayaquil the final estimates will show an exportation valued at about 54,000,000 sucres, as compared with 38,400,000 sucres for 1923 and 46,000,000 sucres for 1922. Cacao was by far the principal product shipped from the port of Guayaquil during the year, the amount being 31,062,814 kilos., valued at 28,460,566 sucres. Coffee was next in order with 3,247,397 kilos., valued at 5,411,567 sucres, followed by gold concentrates (2,683,977 sucres), cotton (1,291,474 kilos., 2,064,670 sucres), and panama hats (143,545 kilos., 1,877,087 sucres).

Other products of less importance were rice, kapok, sugar, hides, and bananas. So far as the whole of Ecuador is concerned, exports from other ports probably put ivory nuts in a second place with a value of about 6,000,000 sucres and have advanced the value of cotton exports to over 3,000,000 sucres. Shipments of sugar during the year were comparatively small, due to the Governmental Decree restricting exportation. Ecuador has long been an exporter of raw materials, but there is an increasing tendency toward the production of manufactured goods, as shown by the exports of such articles as cotton-seed paste, butter, carpets, brooms, leather soles, cigarettes, shoes, and cotton textiles. Although the value of shipments of any of these items is not large, the sum total is of importance.

Java.

The existence in Java of an ample supply of labour available at wages lower than prevail in most other cane growing countries has caused little attention to be devoted heretofore to the introduction of mechanical equipment for cane handling and transportation. As a consequence of this condition the bulk of Java's 20,000,000-ton cane crop is still loaded in the fields on lorries or ox carts by coolies, and unloaded to the cane carriers at the factories in the same way. Estimating that a labourer can load an average of two tons of cane per day, this means that 10,000,000 days of labour are required for the field work alone, calling for the employment of an average of 74,000 men for the four and a half months occupied by the harvest.

Of recent years, however, mechanical unloaders have been introduced to a steadily increasing extent and at present there is observable a strong tendency to substitute light railways for draught animals in hauling cane. Stock raising is rather on the down grade and the supply of draught animals is decreasing. The Java sugar factories now own altogether about 10,000 kilometres of railroad, which is four times the extent of the state railroads and private tram lines put together. The cost of cutting and loading cane in Java is four cents per picul of F. 0·65 ($0.26) per ton.—(*Facts About Sugar*, Vol. XX, No. 20.)

Straits Settlements, Malay States & Ceylon.

It is officially announced that the precentage of standard production of rubber that may be exported at the minimum rate of duty from Ceylon, the Straits Settlements, and the Malay States for the quarter beginning May 1, has been fixed at 65, this being 10 per cent. more than for the preceding quarter.

Following are the averages for the ten quarters since the ordinances came into force on November 1, 1922 :—

Restriction quarter.	*Exportable allowance of standard production. Per cent.*	*Average Price.*
		s. d.
Nov. 1, 1922 to Jan. 31, 1923	60	1 2·285
Feb. 1, 1923 ,, Apr. 30, 1923	60	1 4·858
May 1, 1923 ,, July 3, 1923	65	1 2·242
Aug. 1, 1923 ,, Oct. 31, 1923	60	1 2·904
Nov. 1, 1923 ,, Jan. 31, 1924	60	1 2·175
Feb. 1, 1924 ,, Apr. 30, 1924	60	1 0·917
May 1, 1924 ,, July 31, 1924	60	0 10·974
Aug. 1, 1924 ,, Oct. 31, 1924	55	1 2·632
Nov. 1, 1924 ,, Jan. 31, 1925	50	1 5·983
Feb. 1, 1925 ,, Apr. 30, 1925	55	

The average price for the whole of the first restriction year—from November 1, 1922, to October 31, 1923—was 1*s.* 3·076*d.*, and that for the second restriction year—November 1, 1923, to October 31, 1924—1*s.* 7·070*d.*—(*Financial News.*)

CHEMICAL NOTES.

Compiled by the Department of Chemistry and Soil Science.

Recent Developments in the Nitrogen-fixation Industry.

THE following note is based on an article which appeared in "*Nature*," March 28, 1925, p. 465.

The economic and political effects of the development of the nitrogen-fixation industry have been most profound. Of all the material factors that helped to make the Great War the most devastating conflict in history, the possession by the Germans of adequate plant for making synthetic ammonia, and of adequate personnel for working it, was probably the most important. At present, the yearly production of fixed nitrogen is some 500,000 metric tons, three-quarters of which is made in Germany.

The *arc process* now contributes only a relatively small proportion of the total production of fixed nitrogen, namely, about 36,000 metric tons, its high-power requirement rendering it uneconomical, except in countries possessing abundant natural water power.

Fixation by calcium carbide was developed greatly during the War, but the present outlook for this method is not promising. Calcium cyanamide (which is made from calcium cyanide), has not come up to expectations as a fertilizer, although its power-requirement is only one-fifth that of the arc process. There are yet possibilities, however, for cyanamide can be used as an intermediate product in the manufacture of ammonia, of ammonium phosphate(Ammo-phos), and of urea.

Urea appears to be the nitrogenous fertilizer of the future. It will probably be manufactured by combining synthetic ammonia (made by the direct union of nitrogen from liquid air with hydrogen in the Haber process) and carbon dioxide, at high temperature and pressure. Since 1922, a combination of urea and acid phosphate (Phosphazote) has been made in Switzerland, and a large works in Norway is to commence operations during the current year.

Synthetic ammonia now forms about 65 per cent. of the world's supply of fixed nitrogen. Recent improvements in the Haber process and its modifications include a cheapening in the cost of manufacturing industrial hydrogen, and a better selection of catalyst. Improved catalysts have recently been prepared in the Fixed-Nitrogen Research Laboratory of the United States Government, which, it is expected, will reduce the cost of ammonia production by one-half, even down to the low figure of three pence per pound of ammonia. It is probable that synthetic ammonia will be used in conjunction with the Solvay or Ammonia-Soda process (making sodium bicarbonate from common salt, carbon dioxide and ammonia) for manufacturing ammonium chloride, whose fertilizing value is comparable with that of ammonium sulphate.

The Bucher process of fixing nitrogen as *sodium cyanide* has not quite fulfilled expectations, but, by using soda waste from wood pulp manufacture, the du Pont Co. may yet make it a success. From sodium cyanide, ammonia may readily be prepared by the action of steam.

The rapid growth of the nitrogen-fixing industry has naturally excited interest in the future of the Chilean nitrate industry. It is well known that the methods of extraction employed in Chile are wasteful, but the nitrate deposits are likely to last much longer than was once thought possible, and the Chilean Government could reduce, in emergency, the export tax of 50s. per ton.

Nevertheless, it is only a question of time—a generation or two—before the synthetic processes will hold undisputed sway. Fixed nitrogen is being increasingly used as ammonia in cold-storage plants, as cyanide for gold extraction, and as nitro-cellulose for making artificial leather, celluloid, and other products. Finally, no nation could afford to be without a nitrogen industry for producing explosives, so that even greater developments in the industry may be confidently anticipated.

The Antiscurvy Value of Stored Citrus Fruits.

Miss E. M. Delf reports the results of experiments, commenced in 1918 at the Lister Institute, on the influence of storage on the antiscurvy value of certain fruits and vegetable juices, in the *Biochemical Journal*, Vol. XIX, No. 1, 1925, p. 141. Oranges, lemons, tomatoes and swede-turnips were selected for trial. It was found that when the whole fruits were stored, their antiscurvy value was retained so long as the fruits remained alive and unrotted. The juice of oranges and lemons (limes were not tried), stored for five years in a frozen condition, retained about half its original potency. Canned orange and tomato juices retained much of their value, even after four years storage at ordinary temperature. Lemon juice, preserved with potassium bisulphite, kept its flavour, but lost about five-sixths of its antiscurvy value. Finally, orange and lemon juice, containing rind oil, showed little deterioration at ordinary temperature when kept for one to three years. Canned orange was found to be the most stable of all the preparations examined.

A further use of Ethylene.

Previous notes in this journal have described the use of ethylene for hastening the decomposition of chlorophyll which masks the yellow pigmentation of ripening citrus fruits. We now note that ethylene can be used also for bleaching celery. Plant physiologists at the University of Minnesota* have demonstrated that celery can be blanched by ethylene in six to ten days instead of several weeks, as is usually required when no artificial hastening agent is employed. The process may be rather generally applicable.

* *Indus. Engin. Chem.*, 1925, Feb., p. 221.

RUBBER RESTRICTION.

SPEECH BY MR. H. ERIC MILLER. . . . .
Chairman of the Rubber Growers' Association (Inc.)

[*In the following speech, delivered at the annual meeting of the Rubber Growers' Association (Inc.), Mr. Miller vigorously defends the Stevenson Scheme against its critics.*]

I THINK it is appropriate that I should first briefly review the position of our industry. One's task is, to a certain extent, facilitated by others who, in speeches at general meetings or in communications to the Press, have given prominence to various aspects of the restriction policy as they see them. No objection can be taken to criticism which is founded on a broadminded desire to promote the greatest good of the greatest number, and I believe the restriction scheme has stood the test, not only of criticism conceived in that spirit, but also of criticism based on much lower grounds. (Hear, hear.) The scheme itself was framed with due regard to the interests of all the sections which go to make up the rubber trade of the world, and last, but not least, of the millions of consumers who, in one form and another, derive benefit from the use of rubber.

The City Editor of *The Times* has drawn attention time and again to the growth in the consumption of rubber, and one would gather that he is one of the few people who has observed this. (Laughter.) I have no desire to flatter the Stevenson Committee, but I think it is no secret that even they visualised the prospects of marked expansion in the world's use of rubber. (Hear, hear.) This critic studiously ignores the surplus stocks of rubber which were in existence three years ago, and which were having such a disastrously depressing effect on the market, also the fact that for some years past potential normal production has been largely in excess of the increased consumption. I estimate that actual exports in the two and a half years since 1st November, 1922, have been well over 250,000 tons less than full production would have been if there had been a profitable outlet for all the rubber which could have been produced. (Hear, hear.) This is, of course, a theoretical computation, because the finances of the industry would not, in any circumstances, have stood the strain of bringing into being this further huge quantity of unwanted rubber. During the same period about 150,000 tons of surplus stocks have been absorbed.

Turning now to criticism voiced by the Chairman and the managing director of the Dunlop Rubber Company, after carefully perusing their remarks, I cannot see that either of them suggests that the introduction of restriction was a wrong policy. Sir George Beharrell has, however, done Sir Laurence Guillemard a grave injustice in saying that he condemned restriction in his address to the Federal Council of the F.M.S. last November. Any quotation purporting to represent the gist of the High Commissioner's remark should also have included the following :—

> "But I can see nothing in the situation which would justify the Government in recommending the repeal of restriction. How long it ought to last is a question to be decided in the future." (Hear, hear.)

As I have already mentioned, and as everyone familiar with the reports of the Stevenson Committee should know, the interests of manufacturers and consumers received every consideration, and you are also aware that the Colonial Office have a standing Advisory Committee, on which the manufacturers' associations are ably represented. This Advisory Committee continues to take the most comprehensive interest in the working of the restriction scheme in all its bearings, and I can see nothing whatever in the present situation to necessitate or justify a reinvestigation of the whole question. (Hear, hear.) The conditions which govern the legislation have been published in the most open manner, so that everyone who is at all interested may understand them. The scheme itself was framed so as to put the power of regulating releases primarily in the hands of the buyers. It conforms to the general principles of the law of supply and demand, and fortunately it has not been interfered with to meet intermittent clamour. (Hear, hear.)

The existence of a large surplus stock of crude rubber in the hands of middlemen and/or speculators, coupled with errors of judgment on the part of those in the trade, have, however, resulted in market movements which proved to be inconsistent with the facts. Mainly as the result of unduly optimistic anticipations of American consumption during 1923 and the failure to recognise the extent to which surplus stocks had accumulated, the price rose too rapidly after the introduction of the legislation. There was a corresponding reaction in 1924, which was carried to an extreme in the quarter May-July. Manufacturers were very slow to realise that the depression had been overdone, and they allowed prices to drift, so that there was a curtailment of exports under the scheme to 55 per cent. in the quarter August-October, 1924, and to 50 per cent. in the quarter November, 1924-January, 1925.

As we all know, America is far and away the biggest consumer, using about 70 per cent. of the world's total of crude rubber, and manufacturers there during 1924 pursued a hand to mouth buying policy, notwithstanding the steady reduction which was taking place in visible stocks. Since the absorption of surplus stocks, the buyers of rubber have been in absolute control of the situation and could have secured export releases on an increasing scale simply by maintaining the spot price of rubber in the London market. Yet, even as recently as the quarter August-October, 1924, they allowed the average

to remain below 1s. 3d. and, again, in the quarter November, 1924-January, 1925, when everyone was looking for a 10 per cent. release, they allowed the average price to remain just below 1s. 6d., resulting in a 5 per cent. release instead of 10 per cent. Our printed report includes a table showing the releases since November, 1922, together with the average daily price for spot sheet in London during each quarter, and it is noteworthy that the average price in 2¼ years has been under 1s. 3d. per pound. (Hear, hear.)

Another criticism of the scheme is based on the ground that the Dutch were benefiting unduly at the expense of producers in British territories. Certainly it would have been much more equitable if the Dutch had co-operated, and in that event surplus stocks would undoubtedly have been absorbed sooner, but it may be safely asserted that in the course of this year exports from British producing areas will be required at a rate which will virtually eliminate the disparity between Dutch and British exports. (Hear, hear.) It must also be remembered that the surplus stocks were mainly British owned, and that we have benefited fully on the realisation of these. From the agricultural point of view there is no doubt whatever that the acreage which has been under restriction has improved very considerably as a result of the lighter tapping which has been done—(hear, hear)—its potential yielding capacity and value being thereby greatly enhanced.

As regards the increased output of native rubber from the Dutch East Indies, I can only repeat what has been said many times already, that the trees which the natives are tapping were planted long before the introduction of restriction, and that the competition of supplies from that source would, in any event, have had to be faced so long as the market price of rubber allowed the natives to earn the barest subsistence by prodigal consumption of bark. Although we have not yet got all the reports of the investigators who are looking into the question of native production in different sections of the Netherlands East Indies, we have a very good summary of what is going on in Djambi, from which it may be asserted with confidence that present production is being obtained by most extravagant bark consumption, and I have no doubt that the same is happening in the other areas of native production. We know very well that rubber trees can be abused for a time, but retribution for this is inevitable, and I do not look upon the development of native rubber-growing as a serious menace to the industry as a whole. In my speech at Harrisons and Crosfield's meeting last October I quoted figures showing the approximate consumption of rubber from 1910 to 1923. The absorption figures for 1919-1924 are set out in the report which is now being submitted to you. No one can deny the progressive increase which has taken place in the consumption of rubber, nor that it looks as if the world would inevitably require increasing quantities in the future. (Hear, hear.) What the rate of increase per annum is going to be must remain guesswork, but the history of the past is some guide for the future, and I hold the opinion that before very long it will be necessary to add to the acreage planted with rubber in order to satisfy the consumption which may be looked for by the time such extensions can be in bearing. In this connection it is apparent that some of the oldest planted rubber is slowly depreciating in yielding capacity, and will have to be replaced. There is nothing in the legislation in Malaya or Ceylon to debar estate owners from undertaking such extensions as they may think fit.

The problem of adjusting supply to demand so as to give the producer a reasonable return on the capital he adventures and in order to give the confidence necessary to provide for increased production in the future is not peculiar to the plantation rubber industry, but it is more difficult in the case of a perennial agricultural industry than in the case of crops which are the result of one season's planting and harvesting. The restriction scheme represents an honest attempt to grapple with the problem, and, in my judgment, no criticism of it carries the slightest weight unless the probable future is visualised as well as the past and the present. (Hear, hear.) I consider releases under the scheme should be forthcoming at the rate of 10 per cent. additional, not only on 1st May, but again on 1st August and 1st November, which would bring us up to an 85 per cent. basis. That rate will provide sufficient rubber during 1926 to cover increased requirements and allow a small margin for replenishing stocks to some extent. People who agitate for greater releases immediately overlook the fact that the bulk of the tyres to be sold this summer have already been manufactured, and that there is generally an easing off in July, August and September. When greater manufacturing activity is resumed towards the end of the year, export releases will be on a substantially higher basis, and it is well-known that most producers are carrying a certain amount of rubber in excess of the present low export figure so that the increased releases can be shipped promptly.

Having lately paid a short visit to the United States of America and again met several of the leading tyre manufacturers there, I can assure you that they appreciate the need for continuing to regulate exports, viewed simply from their own standpoint, and that any idea of substantially altering that legislation would cause them serious concern. (Hear, hear.) Several of them individually use more rubber in a year than the total absorption in the United Kingdom, and they have not forgotten the enormous losses which they sustained in 1920-21, as the result of depreciation in their stocks of raw materials and finished goods.

CORRESPONDENCE.

Wanted—"A Cacao Planters' Association."

To the Editor of "Tropical Agriculture."

Sir,

As I stated in the opening paragraph of the February issue of this paper ("*Tropical Life*"), I read with much pleasure the detailed article by Mr. C. Y. Shephard, B.Sc., in your February number, in which he suggests the formation of "A Cacao Planters' Association," and was especially attracted by one or two of the sentences, including the following:—"The Remedy would appear to lie in a co-operative organisation of Producers" "it is gratifying to note . . . that the Empire producers have already agreed upon the general principles of co-operation with a view to increasing consumption. An organisation combining all interests from the Planter to the Manufacturer is urgently required for the purpose of stimulating and increasing the demand for cacao." "It may be argued that producers have no interest in pushing the sales of any particular manufacturer, but they have a very real interest in increasing the demands for cacao products and it is with this aspect that I am particularly concerned."

Thus speaks Mr. Shephard and I agree with every word he says, probably if we were to discuss the position together on these lines, I should even want to go further than he suggests. To help in the matter I reproduce here a table which I am including in the April issue of *Tropical Life*, to show how America compares with Europe in her consumption of raw Cacao. Messrs. Nortz & Co. of New York, it may be remembered, spoke of Germany's increased consumption at the end of 1924, say October to December, when possibly it reached *pro tem* 3½ lb. per head against 3 lb. for America (per annum) "Whitaker" gives the population of America as 95,000,000 souls, and "extra America" 10,000,000 more. On the first, the consumption per head is 3·67 lb. and on the 105,000,000 just 3½ lb. If my figures are correct and I am ready to own that mathematics are not my strong point, taking last year, the following rough calculations show the consumption of cacao per 1,000 or million of population in the 6 chief purchasing centres. The point we all have to decide on is "Saturation Point" in each country; can we approach that and then where else can we go, India, N. Africa, Persia, &c., and do likewise.

	Tons to	*Population*	1 *Ton to*
America ..	157 ,,	95,000 makes	600 people
United Kingdom	52 ,,	42,000 ,,	808 ,,
Germany ..	87 ,,	60,000 ,,	700 ,,
Holland ..	40 ,,	7,030 ,,	176 ,,
France ..	43 ,,	40,000 ,,	930 ,,
Switzerland ..	8 ,,	4,000 ,,	500 ,,

In the above it will be seen of course that I have left out '000's in each case, *i.e.*; Population and Tonnage.

America evidently feels that all is not as it should be with its consumption, because some little time ago I received a letter from Mr. James R. Nicholson of Boston, in which he makes the following suggestions, "I have had the opportunity of seeing some of the copies of *Tropical Life* of recent months in which articles have appeared relative to your "Consume More Cocoa Campaign." These articles were brought to my attention by a leading manufacturer, because there had been developing among our chief makers a strong interest in the possibilities of an International Publicity and Educational Campaign which would benefit producers, manufacturers and distributors alike, as it would increase the general demand for Cacao products. This being the case, it is only natural that we in America, should ask that the benefits are mutual, the cost of carrying on a Campaign should be divided equally among those concerned.

"Speaking briefly we are talking here of raising about $400,000 a year for 3 years to finance an advertising campaign similar to that conducted by the Coffee Growers, the Tea Planters and those interested in paint, in raisins, in fruit, wire, &c., and I now write to ascertain if you feel from what you know of the situation, whether it would be possible to raise among the cocoa producers, even as little as $125,000 a year for 3 years against our $275,000, which would be at the rate of 5 cents per bag on the total importation into the U.S.A., and thus form between us the $400,000 that it is proposed shall be raised. Such a proposition must of course be approved of by our prominent manufacturers, but I have reason to believe that the proposal will meet with their whole hearted approval once it is realised that all sides are willing to pay their share."

Since then I have had further letters from Mr. Nicholson, but at this stage one need only report their receipt. Writing on the subject, however, in the leading trade paper of London I altered these figures in order to place the position of cacao on a basis similar to that on which the Indian Tea interests find themselves to-day in America. I there suggest a total income of £50,000 or $250,000 a year spread over five years, making £250,000 altogether. Of this amount America, as consuming 2/5ths (180,000 tons out of 450,000 tons) of the world's consumption of raw cocoa, would pay £100,000 and the manufacturers and producers elsewhere would have to pay £150,000, not per annum, but altogether. This would work out at the rate of about, 1d. or 4 cents per bag to the actual producer and manufacturer who roasts and grinds the beans. Such a proportion appeals to me as being very fair but whatever the rate works out at, it is good for the West Indies to realise that there is some show of a movement in America to increase the consumption of Cacao in that country, which up to now has always shown the greatest inclination to support the better and best growths of the world, and who are therefore, more likely to help the West Indian planters to obtain a fair price for their crops than might otherwise be apparent.

Had we got already in existence an International Cocoa Planters' Association, backed up by the leading men in each country, it would have been very fit for them to have approached the American market to see whether Mr. Nicholson was over-optimistic or not, but meanwhile the above statement should help considerably to hasten the formation of such a body to work in co-operation with manufacturers everywhere, in deciding which kinds of Cacao are most needed and when the Beans are produced to decide the best methods of propaganda to increase and facilitate their sale and consumption in every nook and corner of the globe and not mainly in the leading countries as at present.

H. HAMEL SMITH,
Editor, Tropical Life.

5, Great Tower Street,
London, E.C. 3.

16th April, 1925.

RAINFALL AND COCOA YIELDS.

BY T. J. S. SMELLIE.

(*Assistant Superintendent of Agriculture*).

[THE following article appeared in a recent issue of the *Journal of the Gold Coast Agricultural and Commercial Society* and illustrates the correlation between rainfall and cocoa yields. The results of similar investigations which were carried out at the Imperial College of Tropical Agriculture by Professor Dunlop were published in the May issue of *Tropical Agriculture*.]

An examination of the rainfall records at Aburi, Assuantsi and Coomassie Agricultural Stations, and records from the old established cocoa plots at the same places will reveal some correlations, which may or may not be mere coincidences, but are of more than ordinary interest, indicating the same effect on the cocoa crop here.

The figures available since certain plots became established are printed below. Only plots of Amelonado variety have been considered.

	Assuantsi Agric. Station.		Aburi Agric. Stn.		Coomassie Agric. Station.	
Year.	Rainfall.	Yield of Pods.	Rainfall.	Yield of Pods.	Rainfall	Yield of Pods.
1913	—	—	58·11	—	—	—
1914	—	—	40·05	51,355	—	—
1915	52·68	—	49·65	37,105	—	—
1916	47·62	183,563	49·66	51,398	—	—
1917	74·17	147,769	73·16	41,369	69·79	—
1918	41·78	172,617	42·24	55,365	56·36	90,344
1919	41·28	138,811	34·54	47,765	40·07	89,003
1920	47·31	96,184	36·40	29,957	56·80	85,977
1921	—	132,750	—	49,333	—	75,520

A study of these figures will show that the year 1917 with the highest rainfall on record is followed by a high yield of cocoa on all stations in 1918.

In order to make the relationship clear to the casual observer the rainfalls and yields are represented by numbers, the highest being given to the highest yield and highest rainfall for the period under review, and preceding year's rainfall numbers placed above following year's yield numbers.

ASSUANTSI.—RAINFALL SINCE 1915.

YIELD SINCE 1916.

Year	1915	1916	1917	1918	1919	1920
Rainfall No.	2	3	1	5	6	4
Yield No.	1	3	2	4	6	5
Year	1916	1917	1918	1919	1920	1921

ABURI.—RAINFALL SINCE 1913.

YIELD SINCE 1914.

Year	1913	1914	1915	1916	1917	1918	1919	1920
Rainfall No.	2	6	4	3	1	5	8	7
Yield No.	3	7	2	6	1	5	8	4
Year	1914	1915	1916	1917	1918	1919	1920	1921

COOMASSIE.—RAINFALL SINCE 1917.

YIELD SINCE 1918.

Year	1917	1918	1919	1920
Rainfall No.	1	3	4	2
Yield No.	1	1	3	4
Year	1918	1919	1920	1921

A glance at these tables will show that the numbers in the top columns are in many cases the same as those in the bottom columns, and in only one case differ by more than 2. At Assuantsi and Aburi the lowest rainfall in 1919 was followed by the lowest yield in 1920.

At Aburi and Coomassie the highest rainfall in 1917 was followed by the highest yield, and at Assuantsi by the second highest yield.

It should be interesting to keep this evidence in view, and consider the matter again when more data has been collected.

CORRESPONDENCE.

A prominent cacao planter in Tobago writes to us as follows: "I was very much interested in an article entitled 'Rainfall and Crop Yields' (by Professor Dunlop) in your May number. The results are shewn more clearly when the rainfall is between 60 and 80 inches than from 80 to 100."

Our correspondent has kept a rain gauge since 1915 and has noted the reaction of rain on crop for a number of years. The average rainfall for the ten years was 61·8 inches. The heaviest rainfall was 72·09 inches followed by an average yield of 2·36 lb. of beans per tree, and the lightest, rainfall 46·34 inches followed by an average yield per tree of only 0·98 lb. He continues "An adequate rainfall from January to May is more conducive to a full crop than heavy rains later. Six years 1918-23 inclusive, shew an average of only 57 inches resulting in damage to trees and very short crops. Last year gave 72 inches of rain. This did not greatly improve the yield of the crop now closing; but the rise in water table is noticeable in more vigorous springs (of water), and will, I hope, result in better crops. January-May rainfall to date has been poor. Perhaps I ought to make it clear that my Estate is situated in the Leeward part which is the driest. The best cocoa Estates are in the Windward district and have a rainfall of 80 to 100 inches. Their advantage in rainfall over Leeward is 20 to 25 inches, and they get that chiefly in the drier months, January-May."

"The rainfall on two Windward Estates for 1924, was 82·39 inches and 108·59 inches, compared with 72·80 inches on my own estate."

The Editor would be obliged if readers in possession of figures relating to monthly rainfall and crop yields over a period of years would forward this data to him. Such communications, unless stated otherwise, will be regarded as confidential.

THE BUDGET.

MR. WINSTON CHURCHILL, Chancellor of the Exchequer, in introducing his first Budget said: "I have now reached the agreeable and comparatively easy task of distributing the surplus of nearly £37,000,000. I have weighed all the different alternatives, and I have done my best to make the proposals and to submit to my Colleagues in the Cabinet, the recommendations which I thought would be most effective and most helpful to the country at the present time. First of all, there is the policy of Imperial preference. It is our policy to give effect to the proposals of the British Government at the Imperial Economic Conference of 1923, in so far as those recommendations do not involve any new or additional duties upon food of any sort or kind. Accordingly, I now submit to the Committee proposals for the removal of the existing duties on Empire dried fruits, and for an increase in the preference on Empire tobacco from one-sixth to one-fourth of the full duty. I may say that I have received assurances from some of the great tobacco firms that this preference will lead to the wholly Empire tobacco being placed on the market at ½d. an ounce less retail than at the present time."

"So far as sugar is concerned, we propose to restore the preference to the level it was before the reduction of duty last year, namely, 4/3½ per cwt., and also to provide that the preference shall remain at that level for ten years, or so long as the full duty does not fall below that level. This is the second time I have proposed a ten years' guarantee on sugar preference to Parliament. I announced such a guarantee in 1921. It was reprobated and repudiated—in my absence—by the right hon. gentleman in 1924, but nothing has occurred to alter our view as to the importance and need of giving a sense of security to the producers of Empire sugar, so that it will enable them to make further plans with something definite to look forward to in the future. We propose to give the sugar producers that security, and to invest the undertaking with statutory sanction."

"July 1st, 1925, will be the date when these Imperial preferences come into operation. The loss to the Revenue will be £1,470,000 in the first year, and £1,720,000 in the full year. We have thus carried out every pledge in the fullest and most precise manner given at the Imperial Economic Conference."

All engaged in the production of cane sugar within the Empire will regard with considerable satisfaction these proposals which, as Mr. Churchill observed, give effect to the pledges at the Imperial Economic Conference of 1923. Owing to the reduction of the sugar duty last year the new preference is, in fact, increased from one-sixth to a little over one-third. No less satisfactory than the increased preference, is the fact that statutory sanction will be given to stabilise the preference at this amount for a period of ten years. The practice of changing the duty on sugar by successive Governments has reacted very unfavourably upon the British cane sugar industry, but with a definite stabilisation for a period of ten years steady development of the production of sugar within the Empire may be expected. Unfortunately the proposals will not take effect until July 1st with the result that a considerable proportion of the present crop will be deprived of the benefit of the increased preference this year. It is to be hoped that the strong representations which have been made will induce the Chancellor to give effect to these changes from the time they receive the necessary Parliamentary sanction.

The following are the new rates of Customs duty on sugar entering the United Kingdom :—

Polarisation.	*General Duty on Foreign Sugars.*	*Preferential Tariff.*	*British Preference.*
	per cwt. s. d.	*per cwt.* s. d.	*per cwt.* s. d.
Not over 76 per cent. ..	5 7	3 6·34	2 0·66
do. 77 do. ..	5 9·4	3 7·95	2 1·45
do. 78 do. ..	5 11·6	3 9·34	2 2·26
do. 79 do. ..	6 1·9	3 10·80	2 3·10
do. 80 do. ..	6 4·1	4 1·19	2 3·91
do. 81 do. ..	6 6·4	4 1·67	2 4·73
do. 82 do. ..	6 8·6	4 3·04	2 5·56
do. 83 do. ..	6 10·8	4 4·42	2 6·38
do. 84 do. ..	7 1·4	4 6·10	2 7·30
do. 85 do. ..	7 3·9	4 7·67	2 8·23
do. 86 do. ..	7 6·4	4 9·25	2 9·15
do. 87 do. ..	7 8·9	4 10·82	2 10·08
do. 88 do. ..	7 11·7	5 0·60	2 11·10
do. 89 do. ..	8 2·5	5 2·37	3 0·13
do. 90 do. ..	8 5·9	5 4·54	3 1·36
do. 91 do. ..	8 9·2	5 6·60	3 2·60
do. 92 do. ..	9 0·6	5 8·77	3 3·83
do. 93 do. ..	9 4	5 10·94	3 5·06
do. 94 do. ..	9 7·3	6 1·02	3 6·28
do. 95 do. ..	9 10·7	6 3·19	3 7·51
do. 96 do. ..	10 2	6 5·25	3 8·75
do. 97 do. ..	10 5·4	6 7·41	3 9·99
do. 98 do. ..	10 8·8	6 9·59	3 11·21
Over 98 do. ..	11 8	7 4·67	4 3·33

The following table shows the effect of the tariff charge upon Empire tobacco :—

	OLD TARIFF.		NEW TARIFF.	
	Duty.	*Preference.*	*Duty.*	*Preference.*
	s. d.	s. d.	s. d.	s. d.
Unmanufactured :				
Stripped or Stemmed :				
Containing 10 lb. or more of moisture in every 100 lb.	8 2·5	1 4·4	8 2·5	2 0·6
Containing less than 10 lb. or more of moisture in every 100 lb. ..	9 1	1 6·1	9 1	2 3·2
Unstripped or Unstemmed : ½d. less General Duty rate				
Manufactured :				
Cigars	15 7	2 7·1	15 7	3 10·75
Cigarettes	12 7	2 1·1	12 7	3 1·75

BOOK REVIEWS.

"TIMBERS OF TROPICAL AMERICA." By SAMUEL J. RECORD, M.A., M.F., and CLAYTON D. MELL, B.A., M.F. 610+XVIII pages. 51 full page plates showing tropical forest scenes, trees and woods. Published by the Yale University Press price $10.00.

THIS most interesting volume disarms criticism by stating in the preface that is "designed to serve at least as a starting point for more detailed investigation" and is "work of the nature of a general reconnaissance .... it is hoped, however, not only that the original contributions and the digest of the available published material will prove helpful, but also that the calling of attention to the many broad gaps in our knowledge and to the chaotic condition of some of the literature and information ..... stimulating and directing exploration and research on the part of other investigators."

PART I. "The countries and their Forests" by Mell occupies 82 pages and is a general survey of the topography and forests of countries stretching from Argentine, Chile and Brazil in the south to the Bahamas and Mexico in the north. It is worth noting that Brazil comprises about one half of South America. Quite a lot of ecological information can be gleaned from these pages. The occurrence of a tropical species of pine in Central America is of interest as is also the Paraná pine (*Araucaria brasiliana*) in southern Brazil. But why, oh why, have the authors omitted to include a map? To the ardent collector of postage stamps the relative positions of Paraguay and Costa Rica, of Guatemala and Bolivia may perhaps be well known; the solver of crossword puzzles may even be of assistance but to the average man recourse to an atlas is necessary sooner or later. It is hoped that this omission will be remedied in subsequent editions.

PART II. The trees and their woods mainly by Record occupies 478 pages in which 75 families are dealt with. Over 100 pages are devoted to *leguminoseae*. This enormous family of about 500 genera and 15,000 species is represented in tropical America by about 125 genera which contains trees, the number of species varying from one or two upwards into the hundreds. The authors state that there is "need for extended research in this family." There most certainly is. Unfortunately, there is almost equal need for extended research in all the other families.

The method adopted in this book is to describe type specimens and 180 representative woods are so described in a uniform manner—common names, general properties, growth rings, parenchyma, pores, vessel lines, vessel contents, rays, ripple marks, gum ducts, remarks, material (origin of).

Thus in the case of mahogany a description is given of *Swietenia* spp. and means of distinguishing between the five known species thereof is only somewhat vaguely indicated.

There is an excellent list of synonyms of common names—over 70 are listed for cigar-box cedar alone (*Cedrela* spp.)—and it is curious how often roble (a spanish name for oak) crops up, the name being applied in various countries to a most heterogeneous collection of trees.

The derivation of many of these names would be an interesting study. *e.g.*: fiddlewood from bois fidele (a *Vitex* spp.); possum wood from poison wood so called from an irritating latex in the bark (*Hura crepitans*).

There is a good index of 7,500 names of trees and woods but although many references are given in the text there is no bibliography. The photographs are interesting. Considering the many years that the British Empire has possessed Colonies in the West Indies it is rather a reflection thereon that it has been left to America to produce such a book. Sooner or later the forest wealth of this part of the world will be exploited much more intensively and the nation possessing the detailed knowledge will reap the benefit thereof.

"Timbers of Tropical America" is welcomed as a book which gives a good general survey of our present knowledge of the forests and timbers of this part of the world but it is hoped that it will not be too long before really detailed information thereon may be available.

R. C. MARSHALL.

"THE FOOD PLANTS OF THE PHILIPPINES," by P. J. Wester, Bureau of Agriculture, Bulletin No. 39 Government of the Philippine Islands, p. 236, together with map and many illustrations; paper cover.

This bulletin by Mr. P. J. Wester, who is well known throughout the Tropics for his work on the propagation of tropical plants, contains the enumeration and description of 532 species of food plants including 464 flowering plants, 1 fern, 55 edible mushrooms and 12 algae. Illustrated with no less than 67 plates the book is a most excellent and useful work of reference, and it is to be regretted that work of this kind is not more commonly done in our own Tropical Colonies. While most of the best fruits of the Tropics are well known in the Temperate Zone, the following passage shows that the resources of the Tropics in this direction are still not fully exploited.

"While the Philippines have not yet given the world any of the major plants of subsistence, yet they have made, or rather will make, a notable contribution in the pili, little known at present, but unquestionably destined to rank with the almond and Brazil nut in the world's trade. The kubili and galó are two other nuts of exceptional eating qualities. Among the fruits the marang, the bauno, and perhaps also the still unclassified tabú, are likely to attain prominence; the kalamondin, kalpi, and miaray are three valuable additions to the citrus fruits of Philippine origin, of which the first named is already being planted in Florida."

S. C. HARLAND.

COLLEGE NEWS.

Examinations began on Monday, June 15th and end on June 26th. The Academic Year 1925-26 begins on Thursday, October 1st, 1925.

Mr. J. B. Hutchinson, B.A., Post-Graduate Student, left for England by the S.S. *Flandre* on the May 28th.

Major F. S. Parsons, B.A., Post-Graduate Student, accompanied by Mrs. Parsons left for Canada by the S.S. *Voltaire* on June 9th. They will later proceed to Africa *via* England.

Important developments in connection with the College made it necessary for the Principal to postpone his return from England. He is now expected to arrive here on June 27th by the S.S. "*Venezuela*."

Professor Ballou, Acting Principal, left on vacational leave for England *via* New York by the S.S. "*Vestris*" on 27th June, 1925. During his absence and until the return of the Principal, Professor Hardy will serve as Imperial Commissioner and Acting Principal.

The Trinidad Agricultural Society under the presidency of Sir Francis Watts met at the College on May 14 last, when Professor Dash delivered a lecture (reproduced elsewhere in this issue) on banana cultivation, which he emphasized with plants and statistics. Those present afterwards repaired to the field to view the experiments in progress and the variety collection.

In our next issue we hope to publish articles on "Forest Fires" by Prof. R. S. Troup, C.I.E., M.A., Sc.D., Director of the Imperial Forestry Institute which recently began work at Oxford; "Quality of Cacao," by Sir Francis Watts, K.C.M.G., D.Sc., *Principal Emeritus;* "The Power Alcohol Problem," by Professor Hardy, M.A., and the conclusion of Professor Dash's article on "Banana Cultivation."

In a recent report on Forestry in Trinidad by the Conservator of Forests, reference is made to the Imperial College of Tropical Agriculture on page 18, where the following statement is made among others "it is not unlikely that a short forestry course will in time be included in the work of the above College." The author of the report in question appears to be labouring under a misapprehension. Reference to the prospectus for 1923, 1924 and 1925-1926 will show that a short course in Forestry is provided for under Agriculture in the second examination. While neither complete nor exhaustive in any sense, it aims to give such instruction as present facilities afford and to stimulate interest on the part of the student in forestry and silvicultural problems, particularly in relation to agriculture.

On Saturday, June the 6th, an excursion party comprising post-graduates and several diploma students with Professor Dash, Mr. Shephard, and Dr. Withycombe, visited Non Pariel Estate, Sangre Grande, the property of Mr. E. A. Robinson, to study rubber cultivation and the various processes involved in the preparation of the product for the market, including tapping, latex collection, coagulation, smoking, &c. Facilities were provided for inspecting the cocoa cultivation and other agricultural activities on the estate, which is an object lesson in courage, persistence and sound management. It is questionable whether under similar conditions in any other part of the tropics there is such a striking example of the immense value of diversity in agriculture demonstrated on so large and efficient a scale. Those who went on the excursion are very appreciative of the opportunity thus afforded and of being delightfully entertained by the owner. Professor Dash in thanking Mr. Robinson emphasized the fact that more could be learned by such a visit—short though it was—than it would be possible to impart in any number of lectures however carefully elaborated.

OBITUARY NOTICES.

IT is with deep regret that we have to place on record the death of Lord Milner, K.G., G.C.B., G.C.M.G., aged 71, on May 13th at his home at Sturry Court, Canterbury. This is not the place to recall his great services to the Empire in general. His loss to the College, of which he had the interest at heart, is peculiarly great. He it was who recognised the importance of the College as a training ground for those whose future is to be the development of the tropical areas of the Empire and he fathered the appeal for funds which bears his name. The College can ill afford the loss of one of its foremost supporters. We offer to Lady Milner, on behalf of all connected with the College, our sincere sympathy in her bereavement.

It is also with deep regret that we announce the death of Samuel Henry Davies, M.Sc., F.I.C., F.C.S., aged 54, at Jordans, Buckinghamshire, on May 9th. He represented the Cocoa Industry on the Governing Body of the College.

Our sympathy is also extended to Mr. G. Moody Stuart, a member of the Governing Body and Chairman of the Finance Committee, on the death of his wife at Haywards Heath on May 12th.

PUBLICATIONS RECEIVED.

"CROP-PRODUCTION IN INDIA" (A critical survey of its problems). By Albert Howard, C.I.E., M.A., Oxford University Press.

"FOOD PLANTS OF THE PHILIPPINES." By P. J. Webster, Bulletin No. 39, Third Revised Edition, Manila Bureau of Printing 1924. Paper cover, pp. 326.

"HANDBOOK OF TRINIDAD AND TOBAGO" for the use of those who wish to know something of the Colony and its institutions. (Not an Official Publication.) Published by the Government Printer, Trinidad. Price 4*s*.

TREND OF THE MARKETS.

[*The notes below are based principally upon running charts of the prices of the basic grades and upon general statistical information gleaned from contemporary publications and cablegrams and are intended to be a record of movements. An attempt is made, where possible, to indicate the market outlook at the time of going to press, but no responsibility for the accuracy and subsequent truth of such observations is assumed. Unless otherwise stated the prices quoted are spot, London.*]

SUGAR.—Further low levels are recorded. Owing to the competition of beet, Cubas are reported at $2\frac{9}{16}$. cents. Consumption is good and stocks are moderate but supplies are good of both cane and beet. The preference on British grown cane sugar is dealt with in another page of this issue.

COTTON.—Prices have shown a further and sharp decline, largely owing to favourable crop advices. Both in England and America the trade has been more or less inactive and the general sentiment bearish. The crop outlook in Texas has changed sharply. Until recently cabled advices have spoken of nothing but drought. Cables now daily speak of rains, in fact the danger lies in the prospect of too much rain. Prices for Mid. American, Spot Liverpool on May 14th closed at 12·26*d.* per lb. but rose to 12·99*d.* on May 21st owing to the announcement of heavy consumption in America.

COCOA.—The market is very quiet with very little price variation. Prices on May 20th included Ceylon Ordinary 105*s.*, Trinidad Mid-Red 80*s.*, Grenada Fine 57*s.* 6*d.*, and Accra Fermented 33*s.* 9*d.* each per cwt. London.

COFFEE.—Santos and Rio coffee are again lower. Sales include Costa Rica at 165*s.* to 200*s.* Mexican 140*s.* to 150*s.*, Kenya at 135*s.* to 145*s.* and Guatemala at 135*s.* to 175*s.* each per cwt. Stocks of Brazilian are small but ample supplies await orders for shipment, and prices will probably move in buyers' favour.

TEA.—The lowest grades are still being cleared and give an artificial appearance of cheapness. Averages on May 20th were Ceylon 20·46*d.*; Indian 17·65*d.*, and Java 12·67*d.* each per lb. spot London. Stocks amounted to 205,500,000 lb. and include 133,000,000 lb. Indian, 31,000,000, Ceylon and 22,000,000 Chinese.

SISAL AND HEMP.—Manila and Sisal both suffered a decline, realising £45 and £43 per ton respectively on May 13th, but subsequently rose to £46 and £43 10*s.* respectively on May 20th.

RUBBER.—The situation is dealt with more fully below. Markets both in London and New York have been very excited and touched 3*s.* for small quantities of spot sheet on May 19th, a violent break occurred subsequently. Stocks on May 16th, amounted to only 7,567 tons and a further reduction is almost bound to take place.

RICE.—There has been no material change in prices. Carolina remaining at 36*s.* per cwt. and Burmese at 15*s.* on May 13th although business in London appears to be developing, and producing countries seem anxious to push sales, owing to the heavy crops, which may result in some slight decline.

RUBBER PRICES.

Considerable interest has recently been focussed on the rubber market. Towards the end of April the market appeared rather quiet and experienced but slight fluctuations. American buyers were holding rather aloof. This attitude was probably due to a variety of rumours. Reports were current in America that an additional percentage (15 per cent. instead of 10 per cent.) would be released on May 1st, and that a further 10,000 tons of rubber held by Chinese dealers would be granted special export permits in addition to the exportable quota. For the first report there was no foundation whatever, while the second refers to a quantity of 6,000 (not 10,000) tons of uncouponed rubber held by Chinese dealers in the Federated Malay States since May 1st, 1923, when the purchase and sale of coupons was made illegal. These dealers are now permitted to purchase coupons from rubber growers or other legitimate owners of coupons, but since these latter automatically forfeit their own right to export an equivalent amount of rubber the total exportable quota remains unaltered. Hence the second of these rumours was as misleading and as inaccurate as the first.

These rumours were co-incident with a violent anti-restrictionist campaign in the Press. In view of the accelerating movement towards standard production the campaign appears particularly ill-timed. During the middle of May, when the nature of these rumours became apparent the market became very excited and prices advanced rapidly until on May 19th, 3*s.* was touched for small quantities of spot sheet. A somewhat violent break occurred on the afternoon of May 19th due to the disinclination of buyers to follow the advance. This rapid fluctuation is bound to stimulate additional opposition to the scheme. Restriction was introduced for the purpose of regulating supply at reasonably profitable prices and has performed this function admirably. Unfortunately it facilitates the work of the speculator—or rather the gambler—whose action recoils not only upon his own head but also upon the supporters of the scheme. Buyers have some slight grounds for complaint but it should be realised that they exercise, or could exercise, an effective control over the exportable quota. If instead of pursuing a hand to mouth policy they had brought forward to a greater extent in the third and fourth quarters of 1924 they would have secured an additional exportable quota.

Stocks in London on May 16th had declined to 7,567 tons compared with 53,045 tons a year ago, and nearly 83,000 tons in August, 1921. A further decline is anticipated.